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U.S. GOVERNMENT RESEARCH REPORTS

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OFFICE OF TECHNICAL SERVICES
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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-414 130 Div. 1
(TISTM/AM) OTS price $4.60

Kaysam Corp., of America, Paterson, N. J.
STUDY OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
Quarterly progress rept. no. 1, 1 Mar-31 May 63, by Eric Nelson and John Kantor. 31 May 63, 42p.
Contract DA36 039AMC02160(E)
Unclassified report

Descriptors: (*Balloons, Materials), Organic compounds, Synthetic rubber, Polymers, Physical properties, Radiation damage, Infrared radiation, Cryogenics, Low temperature research, Reports, Symposia, Mechanical properties, Zinc compounds, Oxygen compounds, Tests, Performance (Engineering), Processing, Films, Flight testing, Esters.

Contents: Properties of balloons and balloon films, study of the literature, evaluation of raw materials, neoprene polymers, polymers other than neoprene, other materials; Evaluation of processing techniques, molecular structure of balloon films, development of optimum compounds; Effect of flight conditions on balloon performance, behavior on inflation and rupture, effect of pre-elongation, effect of ozone, effect of radiation. (Author)

AD-414 492 Div. 1, 27
(TISTA/VGW) OTS price $6.60

Bendix Corp., York, Pa.
AUTOMATIC LIGHT AIRCRAFT READINESS MONITOR.
Applications rept.,
by Richard G. Ballou. Jan 63, 57p.
Contract DA44 177tc641, Task 1D141812D18416
TRECOM Technical rept. 63 8
Unclassified report

Descriptors: (*Army aircraft, Airplane engines), (*Airplane engines, Monitors), (*Helicopter engines, Monitors), Maintenance, Display systems, Electronic equipment, Indicator lights, Maintenance equipment, Checkout equipment, Aviation safety.

This report contains a detailed discussion of the application of an Automatic Light Aircraft Readiness Monitor system (ALARM) implementation to Army aircraft. Studies were made relative to the feasibility of applying the ALARM engineering philosophy to a specific group of Army aircraft. This group includes the following: H-13, H-23, H-37, HC-1, L-19, AC-1, AO-1. Specific applications of the philosophies of ALARM implementation are detailed for each of the preceding aircraft, together with supporting graphic presentations and analytical data. (Author)

AD-414 526 Div. 1
(TISTA/GEC) OTS price $8.60

Bendix Corp., York, Pa.
AUTOMATIC LIGHT AIRCRAFT READINESS MONITOR.
VOLUME III. ADDENDUM - REINSTALLATION, PHASE II. TEST PROGRAM.
Jan 63, 84p.
Contract DA44 177TC641, Task 1D141812D18416
TRECOM TR63 10 Unclassified report

Report on Project Alarm.

Descriptors: (*Army aircraft, Monitors), Liquid level control, Installation, Airplane engines, Transmissions, Vibration, Airframes, Calibration, Test methods, Research program administration.

Discussions are presented on the installation procedures, calibration data, and results of tests on the modified Automatic Light Aircraft Readiness Monitor (ALARM) System Installation. The aircraft airframe was modified and new transmission and gear boxes were installed during the aircraft overhaul. In addition, the tail vibration sensor was relocated. The modified ALARM System virtually eliminates temperature drift, and the results of this phase compare favorably with the test program results. (Author)

AD-414 553 Div. 1, 27
(TISTA/VGW) OTS price $2.60

Bendix Corp., York, Pa.
AUTOMATIC LIGHT AIRCRAFT READINESS MONITOR.
VOLUME II. APPENDICES,
by Richard G. Ballou. Jan 63, 125p.
Contract DA44 177TC641, Task 1D141812D18416
TRECOM TR63 10 Unclassified report

Report on Proj. Alarm. Phase 2, test program.

Descriptors: (*Helicopters, Checkout equipment), (*Helicopter engines, Monitors), Maintenance, Display systems, Electronic equipment, Vibration, Tests, Tables.

Operational test data are tabulated on the application of the automatic light aircraft readiness monitor system (ALARM) to the HU-1 aircraft. (Author)

Division 1 - AIRCRAFT AND FLIGHT EQUIPMENT

AD-414 816 Div. 1, 7
(TISTP/AW) OTS price $6.60

Boeing Co., Seattle, Wash.
HIGH VOLTAGE FLASHOVER OF INSULATING BARRIERS,
by Paul Uhlrich. 19 Sep 52, 58p. Document no. D12534
Unclassified report

Descriptors: (*Electric insulation, Aircraft), (*Aircraft equipment, Electric arcs), Electrical equipment, High altitude, Electric terminals, Countermeasures, Air, Ozone, Humidity, Temperature, Density.

Information concerning the use of insulating barriers between adjacent live terminals or between a live terminal and ground is presented. Curves are included showing the effect of various barriers upon dc flashover voltages for altitudes up to 80,000 feet. Similar curves show the effect of 60-cycle ac flashover voltages for altitudes up to 100,000 feet. High altitude conditions were simulated in the laboratory by use of a vacuum chamber. All tests were performed using the same insulating material (black laminated micarta) for the test blocks. This report is intended to determine the comparative effectiveness of various barriers; no attempt is made here to study the properties of insulating materials. (Author)

AD-414 989 Div. 1
(TISTM/AM) OTS price $10.10

Kellett Aircraft Corp., Philadelphia, Pa.
DETERMINATION OF OPTIMIZED PROPELLERS FOR GROUND EFFECT MACHINES,
by N. J. Miller, N. M. George and R. R. Pruyn.
Aug 63, 106p. Rept. no. 208A90 5
Contract DA44 177TC849, Task 1D021701A04813
TCRECROM TR63 16 Unclassified report

Descriptors: (*Ground effech machines, Propellers (Aerial), (*Propellers (Aerial), Theory, Thrust, Equations, Performance (Engineering), Test equipment, Ducted bodies, Tables, Data, Aerodynamic characteristics, Nozzles, Moments.

A theoretical analysis of the performance of a propellerduct combination operating in ground effect was extended from the work conducted under Contract DA 44-177-TC-524, which was reported in Reference 1. A propeller was designed for optimum twist and taper and to provide a constant velocity across the GEM nozzle, thus producing a maximum lift-to-power ratio of the GEM in accordance with this reference. The optimum propeller design was of the same propeller solidity as a rectangular, non twisted blade propeller tested previously to obtain a direct comparison of performance. The method of analysis used to determine the performance, loads, and moments produced on a blade of arbitrary planform and twist operating in a duct is presented. A test program was conducted to determine the effect of the optimized propeller on GEM performance. The duct nozzle area was also varied to determine the effect of this parameter on propeller optimization. Propeller blade stall, along with large inlet losses which occurred during certain operating test conditions, resulted in performance which could not be accounted for in the analysis. (Author)

AD-415 034 Div. 1, 27
(TISTA/LK) OTS price $11.00

Bendix Corp., York, Pa.
AUTOMATIC LIGHT AIRCRAFT READINESS MONITOR,
by Richard G. Ballou. Jan 63, 1v.
Contract DA44 177TC641, Proj. 9R89 02 015 16
TRECOM Technical rept. 63 10, V1
Unclassified report

Report on Project ALARM.

Descriptors: (*Helicopters, Checkout equipment), (*Helicopter engines, Monitors), Maintenance, Display systems, Electronic equipment, Indicator lights, Design, Feasibility studies, Aviation safety.

The results obtained during the course of Project ALARM test program are described in detail. The documentation includes supporting data, graphs, photographs, and tables pertinent to the tests, together with miscellaneous observations made during the program. In addition, a complete schematic diagram of the ALARM control display system is included. The fundamental objective of the Phase II test and report has been to establish and record the feasibility and utility of all concepts of aircraft condition monitoring provided in the breadboard ALARM experimental system. Based upon the results as detailed herein, conclusions and recommendations are provided as they relate to this objective. For convenience, the infomration has been arranged in a manner considered to be the most practical for a report of this nature. In addition, a chronological summary of the test program effort is presented in tabular form. This documentation identifies significant program dates and events together with a summary of the total accumulated test time utilized in compiling the data described in this report. (Author)

AD-415 465 Div. 1
(TISTA/GEC) OTS price $5.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
AIR VEHICLE FLIGHT PATH OPTIMIZATION.
Final status rept.
May 63, 38p.
Contract AF29 600 2671
AFOSR 4907 Unclassified report

Descriptors: (*Flight paths, Optimization), Numerical analysis, Ranges (Distance), Fuel consumption, Supersonic flight, Aircraft, Airplanes.

The means generally available for treatment of optimal air vehicle flight paths are limited from the viewpoint of practical numerical computations. The method of gradients has been applied to air vehicle problems of maximum range, minimum fuel, and minimum time subject to various constraints with considerable success. Two versions of the gradient method, gradient projection and a gradient/penalty function technique for handling terminal constraints have been employed. An integral form of penalty function has been introduced for incorporation of two limit boundaries in the altitude- Mach number chart: one a minimum altitude limit and the second a Mach number versus altitude envelope corresponding to powerplant and structural limitations. The differing versions of the gradient method have been investigated in range, fuel, and time computations for a hypothetical Mach 3 vehicle, the aim being to assess the relative merits of these versions from the viewpoint of speed of convergence of the successive approximations scheme. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-414 230 Div. 2, 8
(TISTM/AM) OTS price $5.60

Travelers Research Center, Inc., Hartford, Conn.
USE OF RADAR SUMMARY MAPS FOR WEATHER ANALYSIS AND FORECASTING,
by James W. Wilson and Edwin Kessler, III.
June 62, 51p. Technical publication no. 14
Contract FAA BRD363
Unclassified report

Descriptors: (*Radar, Weather forecasting), Analysis, Maps, Radar echo areas, Data, Reliability, Coding, Transmission.

A study of radar summary maps collected from July to December 1961, shows that the echo areas reported are very closely associated with precipitation and that the reported echo intensities and heights of tops are valuable for assessing the occurrence of thunderstorms and other precipitation types. Use of past-hour motion arrows shown on the maps for prediction by translation gives better 3-, 6-, and 9-hr forecasts of echo areas over St. Louis, Mo., than does persistence. The symbols given to indicate the fractional echo coverage within echo areas are usefully related in summer to the probability that precipitation occurs at any point within the echo areas. Such relationships can be combined with the probabilities associated with echo-area forecasts to obtain a probability for future occurrence of echo at any particular point. A principal weakness of the present radar data observing and reporting methods is the coding scheme. The encoded echo observations are very general and the location of echoes within the areas indicated on the radar summary maps is not shown except for particularly noteworthy cases. However, the present data demonstrate both that radar is a valuable aid for terminal and enroute forecasting and that forecasts of useful accuracy and greater precision should be possible when more precise radar data become available. (Author)

AD-414 355 Div. 2
(TISTP/FR) OTS price $1.10

Colorado State U. Research Foundation, Fort Collins.
OCCURRENCE AND CAUSES OF HIGH-LEVEL TURBULENCE.
Final rept., 15 June 61-15 July 63.
15 July 63, 7p. Technical paper no. 45
Contract N189 188 55120A
NWRF 15 0763 076 Unclassified report

Descriptors: (*Turbulence, Troposphere), Troposphere, Stratosphere, Cirrus clouds, Photographic analysis, Jet streams (Meteorology), Wind.

The project has been organized in three phases: (1) photographic field measurement program, (2) aircraft measurements, and (3) synoptic and theoretical studies on clear-air turbulence (CAT) and atmospheric mesostructure. The research results of this project have been published previously. The findings are summarized and recommendations as to application of results and areas of future research are given. (Author)

AD-414 359 Div. 2
(TISTP/FR) OTS price $2.60

Travelers Research Center Inc., Hartford, Conn.
EXPERIMENTAL INPUT-DATA-HNADLING PROCEDURES FOR WEATHER OBSERVATIONS FROM THE FAA MESONETWORK.
Interim rept.,
by Keith D. Hage and Herbert D. Entrekin. June 63, 21p. Technical publication 29
Contract FAA/BRD363, Proj. 204 1
Unclassified report

Descriptors: (*Programming (Computers), Meterorological parameters), Data processing systems, Meteorological parameters, Air traffic control systems, Weather communications, Punched tape, Magnetic tape.

A set of experimental computer programs designed to process high-frequency observations from the Federal Aviation Agency mesometeorological network at Atlantic City, N. J., is described in general terms for users who may require a reference to the scope, options, and limitations of the program without complete detail. The description supplements but does not replace the program specifications and operating instructions. Three principal phases of the input-data-processing procedures are described in sequence. Phase I deals with conversion, unpacking, error-checking, and decoding methods and is outlined in the first sections. Phase 2 deals with the methods of ordering and summarizing the data. Phase 3 briefly discussed the data-merge routine and output formats. An example of unprocessed observations form the mesonetwork, together with the outputs of phases 1 and 2, is presented and discussed at the end of the report. (Author)

AD-414 364 Div. 2
(TISTP/FR) OTS price $3.60

Massachusetts Inst. of Tech., Cambridge.
COMPUTATIONS OF THE EDDY HEAT AND DENSITY TRANSPORTS ACROSS THE GULF STREAM.
Scientific rept. no. 1,
by Abraham H. Oort. 1 July 63, 30p.
Contract AF 19 628 2408, Proj. 8628, Task 862802
AFCRL 63 671 Unclassified report

Descriptors: (*Gulf stream, Ocean currents), Ocean currents, Velocity, Temperature, Density, Energy, Heat transfer, Statistical analysis.

Data of the current velocity, temperature, and salinity of the Gulf Stream, collected during 200 crossings of the current in cruises off Onslow Bay, Jacksonville (30 degrees N) and Cape Hatteras, are used to compute the eddy fluxes of heat and density across the mean current. In each cruise an eddy transport of heat is observed, which is directed from the colder coastal water to the Sargasso Sea in the surface layers. The meanders in the stream appear to increase the thermal contrast across the so called Gulf Stream front and thus violate the ordinary diffusion laws by not transporting heat from the warm to the cold source. The transport of density across the stream is, in general, towards the shore, reflecting mostly the influence of the temperature on the density. (Author)

AD-414 366 Div. 2
(TISTP/FR) OTS price $3.60

Lamont Geological Observatory, Palisades, N.Y.
TIDE AND STORM SURGE OBSERVATIONS IN THE CHUKCHI SEA.

Scientific rept. no. 7
by Kenneth L. Hunkins. May 63, 42p.
Contract AF19 604 7442, Proj. 7628, Task 762805
AFCRL 63 616 Unclassified report

Descriptors: (*Tides, Statistical analysis), Oceans, Ice islands, Barometric pressure, Wind.

Sea level heights were recorded with a tide gauge at Fletcher's Ice Island (T-3) while it was aground in the Chukchi Sea at 71:55 N, 160:20 W. Harmonic analyses were made for the tidal components. The tidal hour for M sub 2 is 9.11 at this location, in good agreement with the co-tidal chart of Sverdrup (1926). Storm surges observed at this location on the continental shelf have a range of about 40 cm. During relatively stationary atmospheric conditions, the storm surge heights can be interpreted as due to the static water barometer effect. During conditions of moving atmospheric pressure systems, storm surge heights differ from those predicted by the water barometer effect. The combined application of Ekman's wind-driven current theory and Bernoulli's equation provides an explanation for these differences. (Author)

AD-414 387 Div. 2
(TISTP/FR) OTS price $3.60

Utah State U. of Agricultural and Applied Science, Logan.
THERMODYNAMICS OF WATER MOVEMENT IN THE SOIL,
by Sterling A. Taylor, Jacob Kijne, Robert Kohl and Samuel Greenberg. July 61, 36p.
Contract DA36 039sc80263, Task 3A99 27 005 08
Unclassified report

Descriptors: (*Soils, Moisture), Moisture, Water, Thermodynamics, Compressive properties, Evaporation, Heat transfer.

An investigation of the thermodynamics of water movement in soil was undertaken. Results are given for a series of experiments conducted over a period of two years. Compressibility experiments were carried out to evaluate the influence of compaction in soil moisture suction potential. In another set of experiments, evaporation of soil water under isothermal conditions was measured to determine the temperature dependence of drying in soil columns. Thermal gradient experiments were used to test the theory of irreversible processes as an analytical tool for describing water flow in soil. (Author)

AD-414 395 Div. 2, 30
(TISTM/BRW) OTS price $1.60

Navy Mine Defense Lab., Panama City, Fla.
DIVER'S INSTRUMENTED OBSERVATION BOARD: PAPER 1, SCIENTIFIC DIVING SERIES,
by G. B. Dowling. July 63, 11p.
Subproj. SF011 01 01, Task 2612
NMDL Rept. 210
Unclassified report

Descriptors: (*Diving, Instrumentation), (*Scientific research, Underwater equipment), Recording systems, Depth indicators, Compasses.

In the course of work involving diving by scientists, a number of specialized instruments and techniques for use by scientific divers were developed, one of these being the ''Diver's Observation Board.'' A combination of basic diving instruments which are generally used separately, the diver's observation board has resulted in greatly increased efficiency of observation and recording of several types of underwater data of value to oceanography. It consists of a 6-by 8-in. writing board in and on which are mounted a compass, depth gauge, inclinometer, pull-out protractor, bubble levels, pencils; it has ruled edges, means for attaching other measurement tools, and means for attachment to the diver's belt. A functional description is given and some applications and their results are discussed. (Author)

AD-414 404 Div. 2
(TISTP/FR) OTS price $19.75

Weather Bureau, Washington, D. C.
CLIMATOLOGICAL SUMMARIES FOR THE SUPERSONIC AIRCRAFT NEW YORK - SAN FRANCISCO ROUTE.
June 63, 313p.
Proj. 206 3R
Unclassified report

Descriptors: (*Meteorological parameters, Statistical analysis), Wind, Temperature, Radar echo areas, High altitude, Tropopause, Statistical analysis, Transport planes, Supersonic planes.

Detailed climatological information is presented for a selected air route (New York to San Francisco and return) to provide needed information for the design and operation of a supersonic aircraft. This information, shown primarily for altitudes between 50,000 and 100,000 feet, includes percentage frequency distributions of: (1) wind aid and retard values for the route, in terms of airplane speeds; (2) winds at the individual stations en route, by direction and speed groups; (3) temperatures at the individual stations en route; (4) temperature deviations from the standard atmosphere, for individual stations en route; (5) mean route temperatures; (6) deviations of mean route temperatures from the standard atmosphere values; (7) height of the lower tropopause; (8) coldest temperature of each sounding versus height of occurrence; (9) heights of radar echoes, based on hourly records; and (10) vertical wind shears for upper air layers with winds greater than 100 m.p.h. In addition, probability graphs and listings of extremes are shown for selected tables. (Author)

AD-414 408 Div. 2
(TISTP/FR) OTS price $8.60

Travelers Research Center Inc., Hartford, Conn.
OBJECTIVE ANALYSIS OF SEA-LEVEL PRESSURE AND SURFACE TEMPERATURE, DEW POINT, AND WIND,
by Albert Thomasell, Jr. and James G. Welsh.
Nov 62, 87p. Technical Pub. no. 19
Contract FAA BRD363, Proj. 204 2
Unclassified report

Descriptors: (*Meteorological parameters, Statistical analysis), Barometric pressure, Temperature, Dew point, Wind.

The successive-approximation technique (SAT) was developed for the objective analysis of sea-level pressure and surface temperature, dew point, and wind over the eastern United States. SAT analyses are demonstrated to be at least comparable to subjective analyses. Continuity within a series of objective analyses is good, and the agreement among the independently analyzed fields of pressure, temperature, and wind is excellent. Developmental tests using the airways observation network have shown that the best analysis is

produced by using large influence radii, a smoothing operator, and a grid mesh of approximately 50 mi. The effect of using large influence radii and smoothing in SAT is to approximate curvilinear interpolation between observations. This was interpreted to mean that such curvilinear interpolation is the best method of specifying the analysis field between data points. A typical analysis for the eastern U.S. requires 2 or 3 min on an IBM 7090 electronic computer. An alternative analysis procedure, which performs curvilinear interpolation directly, is suggested as a possible method for reducing the machine time required for an analysis. (Author)

AD-414 411 Div. 2
(TISTP/FR) OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
RECENT INVESTIGATIONS OF THE ATMOSPHERE AND SURFACE OF MARS,
by N. N. Sytinskaya. 5 Aug 63, 15p.
RSIC 44 Unclassified report

Trans. from Priroda (Nature), 45:6, pp. 33-41, 1956.

Descriptors: (*Mars, Planetary atmospheres), Planetary atmospheres, Clouds, Fog, Temperature, Polar regions, Surface properties.

AD-414 433 Div. 2, 8
(TISTP/FR) OTS price $2.60

Oregon State U., Corvallis.
INVESTIGATION OF INSTRUMENTATION AND TECHNIQUES FOR ARMY WEATHER OBSERVATION.
Quarterly progress rept. no. 1, 1 Feb-30 Apr 62,
by Fred W. Decker, Kenneth H. Shreeve, and James W. Sears. 30 Apr 62, 22p.
Contract DA36 039sc89186, DA Proj. 3A99 27 005 07
Unclassified report

Descriptors: (*Meteorological radar, Radar pulses), (*Radar pulses, Meteorological radar), Oscilloscopes, Radar recording cameras.

The results of the single-pulse preliminary study show such rapid fluctuations in the echo strength from a given volume of space that in the data examined the weather radar echo intensity from a given range had negligible correlation with the intensity of echo from the same range produced by the immediately preceding pulse. This indicated achievement of independence in only 0.005 sec or less, a time interval so brief as to warrant further examination under various weather conditions to determine whether meteorologically significant information may appear in such rapid fluctuations. (Author)

AD-414 444 Div. 2, 4
(TISTM/EJH) OTS price $15.50

Cornell U., Ithaca, N. Y.
THE INTERSTELLAR ABUNDANCE OF THE HYDROGEN MOLECULE
by Robert J. Gould. Jan 63, 226p. Rept. no. CRSR 120
Grant AF AFOSR62 191
Unclassified report

Descriptors: (*Interstellar matter, Hydrogen) (*Hydrogen, Interstellar matter) Kinetic theory, Recombination reactions, Surfaces, Adsorption, Exchange reactions, Dissociation, Selection rules, Excitation, Resonance, Fluorescence, Scattering, Photochemistry, Raman spectroscopy, Cosmic rays, Iodides, Hydrogen compounds, Clouds, Ionization, Galaxies, Molecules, Atoms, Mathematical analysis.

Contents:
Mechanisms for the formulation of molecular hydrogen
Dissociative processes for a static interstellar medium
Dissociative effects of clouds motions
Summary
Appendix A: Photodissociation and photoionization
Appendix B: Velocity distribution of H I clouds
Appendix C: Stromgren spheres
Appendix D: Problem in Brownian motion

AD-414 449 Div. 2
(TISTP/FDR) OTS price $2.60

Travelers Research Center, Inc., Hartford, Conn.
DEVELOPMENT OF STATISTICAL OPERATORS FOR PREDICTION OF LOW CLOUDS.
Interim rept.,
by Duane S. Cooley and Abraham M. Pavlowitz.
June 63, 24p. Technical Pub. 30
Contract FAA BRD363, Proj. 204 2
Unclassified report

Descriptors: (*Clouds, Statistical analysis), Cloud cover, Geography, Statistical analysis, Mathematical prediction, Operators (Mathematics).

A study was made of the statistical prediction of low-cloud amounts and cloudbase heights. Cloud data and other atmospheric parameters over the central and eastern United States were analyzed on a grid mesh of approximately 52 mi (1/4-NWP grid). Predictability of low-cloud amount was evaluated by using the screening-regression method and testing the significance of the selected predictors. Predictors considered were low-cloud amount, empirically normalized cloud height, pressure, 850-mb height, surface and 850-mb temperature and dew-point spread, 850-mb geostrophic wind, and derived terms such as vorticity, divergence, and advection. The regression equations were tested on independent data. The equations may be useful for short-period prediction because they provide a better cloud forecast than persistence. They would probably be improved by including other predictors and by extending the area from which the predictors are chosen. (Author)

AD-414 488 Div. 2
(TISTP/MFA) OTS price $7.70

Columbia U., New York.
GLACIAL AND POST GLACIAL QUICK CLAYS,
by Paul F. Kerr and Richard S. Liebling. Aug 63, 72p. Scientific rept. no. 1
Contract AF19 604 8387, Proj. 8623, Task 862302
AFCRL 63 253 Unclassified report

Descriptors: (*Clay, Glaciers). (*X-ray diffraction analysis, Clay minerals) (*Particle size, Analysis). Silicates, Measurement, Particles, Quartz.

Essentially horizontal deposits of glacial and postglacial marine clays, long static in flat terrain, may suddenly display mass flowage with destructive consequences. The nature of the clays and the circumstances involved in their behavior have been the subject of study. The mineralogy of these clays, known as quick clays, has been determined for samples from Scandinavia, Canada and the northeastern United States. Particle size measurements of non-quick clays yield an average amount of material less than two microns of 31.6 per cent by weight, but in quick clays the amount is 57.3 per cent. The major critical conditions which contribute to quick clay movement in flat terrain appear to be: a substantial quantity of flake-like particles of colloidal size (Equivalent to approximately 40 per cent or more by weight of dry sample); a substantial quantity of water (roughly 50 per cent); a reduction in electrolyte concentration below about 5 grams of salt per liter; and a random orientation of particles induced by coagulation during deposition. (Author)

AD-414 510 Div. 2
(TISTP/FR) OTS price $12.00

Massachusetts Inst. of Tech., Cambridge.
ENERGETICS OF THE SOLAR SEMIDIURNAL TIDE IN THE ATMOSPHERE,
by Walter L. Jones. 10 July 63, 161p. Scientific report no. 2 planetary circulations project
Victor P. Starr, Director
Contract AF19 628 2408, Proj. 8628, Task 862802
AFCRL 63 690 Unclassified report

Descriptors: (*Atmospheric tides, Energy), Atmosphere, Energy, Transport properties, Viscosity, Damping, Convection, Electric fields.

A study was made of the energy generation, transport, and dissipation by the solar semidiurnal tide in the earth's atmosphere. Computations based on recent observations at Terciera, Azores show a downward transport of available potential energy in the troposphere, reaching a maximum of 7 x 10 to the -3 watts per square meter at or near the ground. Similar data for Fort Worth, Texas, substantiates the assumptions used in this calculation. This flux is generated primarily by water vapor insolational heating, though horizontal convergence of tidal available potential energy may be significant. Neither eddy viscosity nor an inverse correlation between convective heating and tidal temperature fluctuation appear adequate as energy sinks for this flux. Instead, it is proposed that the undulations of the earth's surface interact with the main tidal motion to generate secondary internal gravity waves; these propagate energy vertically to levels where they are viscously damped, and thus represent a loss of energy to the tide. (Author)

AD-414 516 Div. 2
(TISTP/FR) OTS price $3.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
SOME FEATURES OF THE F REGION ELECTRON DENSITY AND HEIGHT VARIATIONS IN THE EQUATORIAL REGIONS,
by Y. V. Somayjulu. 1 Sep 63, 27p. Scientific rept. no. 192
Contract AF19 604 4563; Grant G18983, Proj. 8605, Task 860502
AFCRL Rept. no. 63 817 Unclassified report

Descriptors: (*Ionosphere, Electron density), Electron density, Diurnal variations, Ionospheric disturbances, Deformation, Tropical areas.

The average quiet day variations in NmF and h(.9NmF) are given for the equatorial stations Talara and Huancayo, derived from the true-height profiles for the five international quiet days for each of the IGY months. The results show that the forenoon and evening slopes of the Nm(t) curves, as well as the post-sunset increase in the F region heights, have similar semiannual variations. It is established that this semiannual variation has a close correlation with the variation of the cosine of the noon solar zenith angle of the sun, indicating that electrodynamic drifts are important in producing the observed seasonal variation. It is shown that vertical drifts alone are inadequate to account for the large slopes in the Nm(t) curves. It is established that east-west drifts, such as those observed experimentally, can cause large variations in these slopes. A seasonal variation of the wind pattern may account for the observed seasonal variation. On this model the phenomenon of the post sunset increase in F region heights, and its seasonal variation, is explained. It is indicated that several other equatorial phenomena such as Spread F and flutter fading can be explained on this basis. It is concluded that, in the equatorial regions, the ionospheric electrostatic fields play a dominant part in causing the equatorial 'anomalies'. (Author)

AD-414 532 Div. 2
(TISTP/FR) OTS price $4.60

National Engineering Science Co., Pasadena, Calif.
THEORETICAL INVESTIGATION OF SEMI-INFINITE ICE FLOES IN WATER OF INFINITE DEPTH.
Final rept.,
by James A. Hendrickson and Lois M. Webb.
June 63, 43p. Rept. no. P457SN113
Contract NBy32225
Unclassified report

Descriptors: (*Ice, Water waves), Stresses.

The response of semi-infinite ice floes to water waves is analyzed for relatively deep water. If the floe submergence is neglected it is found that a progressive wave is transmitted. The stress produced by this transmitted wave is determined for various floe thicknesses and incident wave lengths. When the submergence is not neglected it is necessary to use a finite difference approach to the solution. Such a solution is attempted and the results and accompanying numerical problems are considered in detail. (Author)

AD-414 539 Div. 2
(TISTP/FR) OTS price $3.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
AN INVESTIGATION OF SPECIALIZED WHITEOUT SEEDING PROCEDURES,
by T. R. Mee, Jr. and W. J. Eadie. Mar 63, 11p.
Contract DA11 190ENG100, Task 8X99 27 001 03
CRREL Research rept. 124 Unclassified report

Descriptors: (*Storms, Countermeasures), (*Artificial precipitation, Storms), Countermeasures, Snow, Carbon dioxide, Solidfied gases, Pellets, Instrumentation, Drones, Ice, Crystals, Clouds, Velocity, Sublimation.

Phase I of Project Whiteout was conducted in North Greenland to determine the extent to which whiteouts could be modified. Phase II is a laboratory experiment to develop specialized whiteout-dissipation procedures. Findings indicate that a 'stationary' seeding technique may modify supercooled clouds and fogs in the -5C to 0C range and the use of low-density, high drag flakes or pellets of dry-ice may permit an extension of conventional aircraft seeding techniques to warmer temperatures. Several types of seeding vehicles were examined, including drone aircraft, mortar shells, rockets, and standard aircraft. A mechanism for the conversion of liquid CO sub 2 into dry-ice pellets was conceived for use in emergency-seeding aircraft devices. (Author)

AD-414 556 Div. 2, 5, 13
(TISTP/MFA) OTS price $6.60

Boston Coll., Mass.
GEOLOGY OF THE BASEMENT COMPLEX OF SOUTHEASTERN NEBRASKA, NORTHEASTERN KANSAS AND VICINITY,
by James W. Skehan. 12 July 63, 57p. Scientific rept. no. 1
Contract AF19 628 1622, Proj. 4610, Task 461001
AFCRL 63 173 Unclassified report

Descriptors: (*Geology, Analysis), (*Underground structures, Communication systems), Geophysics, Geological survey, Structural geology, Stratigraphy, Faults (Geology), Engineering geology, Igneous rock.

This area is underlain by a great but variable thickness of stratified rock and granite ranging in age from Precambrian to Recent. The Precambrian rocks consist of granite and metasediments which have had a complex history. The upper surface of the Precambrian forms an irregualr faulted ridge, the Nemaha Arch. In Pawnee and Johnson Counties, Nebraska, the Precambrian surface, which here is granite, rises to as much as 539 feet above sea level and in Nemaha County, Kansas, to as much as 588 feet. The Nemaha Arch is cut by a major zone of fracturing, the Humboldt fault zone. This fault zone has undergone recurrent earthquake movements from Precambrian time to the present with the rocks east of this fault having been downthrown at least 2,600 feet Geophysical data indicates that the Precambrian rocks of Kansas and Nebraska may be essentially a continuation of the sequence in the Lake Superior region. All available geological and geophysical data, including deep resistivity studies, indicate that the Precambrian basement complex is unsuitable for both deep underground communication and deep underground facility installation. (Author)

AD-414 579 Div. 2
(TISTP/FR) OTS price $3.60

Marine Lab., U. of Miami, Coral Cables, Fla.
MESOSCALE STUDIES OF INSTABILITY PATTERNS AND WINDS IN THE TROPICS.
Interim technical rept. no. 3, 1 Jan-30 Apr 63,
by Harold P. Gerrish and Homer W. Hiser.
July 63, 30p. Rept. no. 8226 3; ML63378
Contract DA36 039sc89111, Proj. 3A99 27 005
Unclassified report

Descriptors: (*Radar echo areas, Rainfall), Rainfall, Radar tracking, Motion, Atmospheric motion, Wind, High altitude.

Comparison of echo motions with winds aloft for a case study of 1800Z, 25 August 1961 is presented. Particular reference is made to the translational motion of precipitation echoes in the tropics, as determined by tracking selected small echoes and cells. These echo motions agree best with the 3-23,000-ft mean-layer wind, with both the 3-10,000-ft mean-layer wind and the 10,000-ft wind as next best. Preliminary results of an echo-height study of certain mesoscale waves in the esterlies are also included. These results essentially suggest that a well known classical cloud pattern for synoptic-scale waves in the easterlies is valid on the mesoscale as well. (Author)

AD-414 589 Div. 2
(TISTP/FR) OTS price $10.50

Travelers Research Center, Inc., Hartford, Conn.
FURTHER APPLICATIONS OF MOVING-COORDINATE PREDICTION MODELS TO NORTH AMERICAN CYCLONES,
by Frederick P. Ostby, Keith W. Veigas, and John E. Emerson. June 63, 127p. Technical pub. no. 31
Contract FAA/BRD363, Proj. 204 2
Unclassified report

Descriptors: (*Cyclones, Mathematical prediction), Statistical analysis, Mathematical prediction, Equations, Barometric pressure, Weather forecasting.

A moving-coordinate prediction-model technique applied to East Coast cyclones has been extended to predict cyclone behavior in most of North America for both summer and winter. Equations based on stratification, incorporation of past history, and addition of derived variables are developed from 833 cases. Comparison with equations based on unstratified data, no past history, and only simple variables shows that the latter set of equations is usually superior. This 'base-technique' set of equations yields vector-position rms errors of 2.38, 4.26, and 5.96 deg lat and central-pressure rms errors of 4.28, 6.88, and 9.03 mb for 12, 24, and 36 hr when applied to 213 independent winter cases. Subsequent refinements achieve vector-position rms errors of 2.31, 4.10, and 5.88 deg lat and central-pressure rms errors of 4.19, 6.88, and 9.03 mb for the 3 time periods. Comparable results for climatology are 3.42, 6.13, and 8.34 deg lat for position and 4.83, 8.03, and 10.50 mb for central pressure. Results for summer cyclones are also presented. Equations based on surface data only are developed and tested. They are useful whenever upper-air data are unavailable. Worksheets for operational application of the techniques are included. (Author)

AD-414 621 Div. 2
(TISTM/TLG) OTS price $3.60

Marine Lab., U. of Miami, Coral Gables, Fla.
INVESTIGATIONS OF AMERICAN TROPICAL AND SUBTROPICAL SEAS SPONSORED BY THE OFFICE OF NAVAL RESEARCH.
Progress rept., 1 June 62-31 May 63,
by F. G. Walton Smith. 31 May 63, 36p. Rept. no. 63 5; ML63382
Contracts Nonr840 01 and Nonr4008 02
Unclassified report

Descriptors: (*Oceanology, Reports), (*Sea water, Chemical analysis), Sedimentation, Carbonates, Stratigraphy, Ocean currents, Ocean bottom topography, Oceanographic data, Ocean bottom sampling.

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

Contents: Chemical oceanography and marine geochemistry: Kinetics and Physical Chemistry of Sea Water Surface Films; Primary Production and Distribution of Trace Elements; Carbonate Chemistry on Bahama Banks; Geochemistry of Sediments; Sedimentation and Stratigraphy: Paleotemperature; Foraminifera Studies; Coccolith Studies; Sedimentation; Morphology of the Sea Floor: Topography of the Straits of Florida; Ripple Marks in the Straits; Physical Oceanography: Investigations in the Florida Straits; General Circulation in the Ocean; Data Reduction; Oceanographic Instrumentation: A Doppler Current Meter; Instruments and Devices; Marine Operations. (Author)

AD-414 640 Div. 2, 6
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE ACCURACY OF RADAR MEASURING THE ALTITUDE OF CLOUDS,
by A. M. Borovikov and V. V. Kostarev.
18 July 63, 9p.
FTD TT63 539 Unclassified report

Trans. from, Tsentr. Aerol. Observ., Nr. 36, pp. 37-42, 1961.

Descriptors: (*Clouds, Height finding), Height finding, Radar, Aircraft.

Results of comparative radar and aircraft observations of altitude boundaries of clouds are discussed. It was established, that with the aid of a radar station, developed at the TSAO, is possible a convenient for practical purposes altitude measurement of the upper boundaries of clouds with an accuracy of ± 100 m. The practical advisability of the employing the radar method for measuring the altitude of lower cloud boundaries is explained. This is due to the masking of lower boundaries of radar images of clouds on account of large particles falling out from the clouds. (Author)

AD-414 641 Div. 2
(TISTP/FR) OTS price $4.60

Chicago U., Ill.
MESOMETEOROLOGICAL STUDY OF SELECTED AREAS IN THE UNITED STATES.
Quarterly technical rept. no. 6, 1 Aug-31 Oct 60,
by Henry A. Brown. Oct 60, 1v.
Contract DA36 039sc78901, Proj. 3A99 07 001 04 01
Unclassified report

Descriptors: (*Meteorology, Geography), Weather stations, Convection, Temperature, Statistical analysis, Meteorological charts.

Results of an analysis of data collected by the U. S. Army Electronic Proving Ground surface network at Fort Huachuca, Arizona, on July 14-15, 1958, reveal a surprising degree of organization in convective activity. The case represents a typical situation of the summertime rainy season. The origin of convective activity and its subsequent organization and motion as a mesoscale system is revealed in the analysis. An explanation of the apparent motion of the mesosystems is advanced and the time variation of convective activity over mountains and valleys is noted. A preliminary study of the mesoscale systems of June 4, 1959, in the Texas-Oklahoma area indicates that the systems are less intense than those previously studied. Base maps of the pressure-temperature network, precipitation network, and radar coverage are presented. (Author)

AD-414 642 Div. 2
(TISTP/FR) OTS price $8.60

Colorado State U., Fort Collins.
ON THE BALANCE OF FORCES AND RADIAL ACCELERATIONS IN HURRICANES.
Atmospheric sciences research rept. no. 1,
by William M. Gray. Feb 61, 90p. Rept. no. CER61WMG16
Unclassified report

Descriptors: (*Tropical cyclones, Acceleration), Acceleration, Heating, Condensation, Barometric pressure, Wind.

The balance of forces in hurricanes was examined along the radial direction in stationary and moving coordinates; further, the radius of trajectory curvature has been computed in selected portions of ten flight missions. The Coriolis acceleration proved negligible compared to the centrifugal acceleration as expected. But gradient or cyclostrophic balance in general is not achieved by a wide margin, both along the radial axis and in natural coordinates. The pressure gradient far exceeds that required to balance the centrifugal acceleration to the left, and falls somewhat short of the requirement to the right of the direction of motion. In moving coordinates this asymmetry is reduced but by no means eliminated. Hence the maximum wind may be interpreted as produced by 'overshooting' toward low pressure far beyond the point of equilibrium. A similar situation appears to exist with respect to many extratopical wind maxima, especially high-speed centers along jet streams. (Author)

AD-414 643 Div. 2
(TISTP/FR) OTS price $6.60

Chicago U., Ill.
MESOMETEOROLOGICAL STUDY OF SELECTED AREAS IN THE UNITED STATES.
Quarterly technical rept. 1 May-31 July 60,
by Henry A. Brown. July 60, 1v.
Contract DA36 039sc78901, Proj. 3A99 07 001 04 01
Unclassified report

Descriptors: (*Meteorology, Geography), Georgraphy, Weather stations, Microbarometric waves, Atmospheric precipitation, Temperature, Barometric pressure.

The results of two analyses using mesometeorological techniques are given. Data for the two cases were provided by the New Jersey Microbarograph Network and the Dugway Proving Ground Network. Areas of the analyses were extended through use of the regular U. S. Weather Bureau Observation Network. Results of the New Jersey analysis indicated the origin of mesosystems, their development, dissipation, and the horizontal dimensions of the systems at various stages of their lives. Characteristics of the mesosystems during each phase of their development were also noted. The analysis of the Dugway Network data graphically revealed the passage of a mesosystem through the area. Streamline analyses and data sheets of the network stations revealed the time and space changes that occurred. (Author)

AD-414 644 Div. 2
(TISTP/FR) OTS price $3.60

Florida State U., Tallahassee.
THE POTENTIAL-ENERGY BUDGET OF THE STRATOSPHERE OVER NORTH AMERICA DURING THE WARMING OF 1957.
Scientific rept. no. 3,

by M. A. Lateef. 20 June 63, 23p.
Contract AF19 628 394, Proj. 8604, Task 860405
AFCRL 63 689 Unclassified report

Descriptors: (*Stratosphere, Energy), Energy, Heating, Atmospheric motion, Enthalpy, Periodic variations.

The evaluation of the terms in the balance equation for potential and internal energy, was carried out using the 100-mb, 50-mb and 25-mb values of geopotential, temperature, the geostrophic wind components and adiabatic vertical motion at each point of a grid covering most of the North American continent and the adjacent North Atlantic. The investigation considered a limited volume in which changes in potential and internal energy (alternatively referred to as total potential energy) were affected by flux of energy across the boundaries. (Author)

AD-414 671 Div. 2
(TISTP/FR) OTS price $6.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH IN TROPICAL METEOROLOGY.
Final technical rept.
31 July 63, 29p.
Contract DA36 039sc89179, Proj. 3A99 27 005
Unclassified report

Descriptors: (*Meteorology, Tropical regions). Tropical regions, Temperature, Wind, High altitude, Rainfall, Periodic variations, Tropical cyclones, Radiosondes, Data, Meteorological charts.

Contents: Upper air flow between 5 degrees and 40 degrees N in July; Rainfall and the bi-annual period; Atmospheric conditions immediately prior to the formation of hurricanes; and One the accuracy of radiosonde data in the Carribbean, and a suggestion for improvement.

AD-414 685 Div. 2
(TISTP/FR) OTS price $6.60

Chicago U., Ill.
DESIGN OF A THREE-DIMENSIONAL MESO-METEOROLOGICAL NETWORK.
Quarterly technical rept. no. 4, 1 Jan-30 Apr 60, by Tetsuya Fujita and Henry A. Brown. 30 Apr 60, 1v.
Contract DA36 039sc78901, Proj. 3A99 07 001 04 01
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Weather stations, Meteorology). Meteorology, Meteorological parameters, Data, Meteorological instruments, Meteorological radar, Photography, Aerial photography.

Results of analyses of case studies of numerous networks in various locations are combined in a discussion of the observations necessary for the operation of a three-dimensional mesometeorological network. Four observational categories are considered: (1) surface, (2) upper air, (3) radar, and (4) photography. Each category is discussed in terms of the elements measured, optimum time and space resolution, accuracy required, and techniques for analysis. A model network design incorporating the above results is then proposed. This is followed by a proposed practical design for three different areas in the United States characterized by coastal, plains, and mountainous environments. (Author)

AD-414 706 Div. 2
(TISTP/FR) OTS price $3.60

Harvard Coll. Observatory, Cambridge, Mass.
CLASSIFICATION OF SOLAR PROMINENCES FOR SUNSPOT CYCLE NO. 19 -- 1959,
by Donald H. Menzel and F. Shirley Jones.
Aug 63, 33p. SR22
Contract AF19 604 4962, Proj. 7649, Task 764901
AFCRL 63 686 Unclassified report

Descriptors: (*Solar flares, Classification), Classification, Analysis, Tables.

A tabulation and analysis of the behavior classification of prominences observed during 1959 at the Sacramento Peak Observatory, Sunspot, New Mexico is given. Table I contains the measures of position and area, the intensity estimates, and the classification according to the Menzel and Evans scheme (1953) with the addition of the classes ASa (coronal rain in spot areas) and ANe (suspended clouds not associated with sunspots), of all prominences in the survey. (Author)

AD-414 718 Div. 2
(TISTP/FEM) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TRANSACTIONS OF THE CENTRAL AEROLOGICAL OBSERVATORY (SELECTED ARTICLES).
3 June 63, 67p.
FTD TT62 1511 Unclassified report

Trans. from Trudy Tsentral'noy Aerologicheskoy Observatorii, no. 32, Leningrad, pp. 46-65, 66-72, 73-83, 84-87, 1961.

Descriptors: (*Solar radiation, Absorption), (*Radiators, Polar regions), (*Scattering, Atmosphere), (*Troposphere, Solar radiation), Measurement, Pyrometers, Light, Errors, Sensitivity, Sky brightness, Barometric pressure, Atmospheric temperature, Galvanometers.

AD-414 729 Div. 2
(TISTP/FR) OTS price $4.60

Federal Aviation Agency, Atlantic City, N. J.
NATIONAL AVIATION METEOROLOGICAL REQUIREMENTS THROUGH 1975,
Oct 61, 43p.
Unclassified report

Descriptors: (*Meteorology, Civil aviation), Weather forecasting, Meteorological parameters, Data, Civil aviation, Air traffic.

Contents: Common Aviation Weather Information Requirements through 1975-- Requirements of airspace users, Requirements of air traffic control, Requirements of aviation meteorologists, Common weather information requirements; Proposed solutions to problem areas.

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-414 951 Div. 2
(TISTP/FR) OTS price $8.10

Naval Air Station, Norfolk, Va.
SYNOPTIC METHODS FOR DEVELOPING FORECAST TECHNIQUES.
May 63, 73p.
NWRF Rept. no. 38 0563 073
Unclassified report

Descriptors: (*Weather forecasting, Handbooks), Handbooks, Meteorological parameters, Fog, Statistical analysis, Air mass analysis.

Contents: Introduction; Statistical Methods; The General Method; Selecting Forecast Predictors; Presenting and Testing Predictors; Some Examples - Prewarm Frontal Ceillings and Visibility, Advection Fog, Sea Fog, Radiation Fog, Post-Cold Frontal Ceilings. (Author)

AD-415 013 Div. 2, 15
(TISTM/TCG) OTS price $2.60

MITRE Corp., Bedford, Mass.
DISTORTION OF SIGNALS TRANSMITTED THROUGH THE IONOSPHERE,
by R. L. Greenspan. Aug 63, 23p. Rept. no. W5810
Contract AF19 628 2390, Proj. 490M
ESD TDR63 289 Unclassified report

Descriptors: (*Ionosphere, Signals), (*Signals, Distortion), (*Mathematical analysis, Fourier analysis), Wave transmission, Ultrahigh frequency, Integral equations, Velocity.

The steady state solution of the Maxwell Equations for wave propagation is interpreted in terms of a transfer function which described the ionosphere as a linear dispersive system. The effect of the ionosphere on signal transmission is obtained by inversion of a Fourier integral, and the relevance of group velocity, signal velocity, and time delay concepts is examined. The dispersion decreases the output signal of a typical UHF correlation receiver by less than 3db for normal ionospheric conditions. (Author)

AD-415 017 Div. 2, 1, 30
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HIGH-ALTITUDE PROBING OF THE ATMOSPHERE ON THE IL-28 AIRPLANE,
by V. A. Devyatova. 18 July 63, 16p.
FTD TT63 534 Unclassified report

Trans. from Trudy Tsentral'noy Aerologicheskoy Observatorii, Gidrometeoizdat (Otdeleniye), Nr. 43, Moskva, pp. 47-56, 1962.

Descriptors: (*Atmosphere, Aircraft), (*Meteorology, Aircraft), (*Airplanes, Meteorology), Meteorological instruments, High altitude, Data storage systems, Tapes, Recording systems, Airspeed, Instrumentation.

The article is devoted to a new kind of aircraft probing of the atmosphere. A description is given of the equipment of the high-altitude probing aircraft Il-28, its system of flying, the observations in flight, and the particulars of the working of the recording tape of K4-51 automatic optical recorder. (Author)

AD-415 037 Div. 2
(TISTP/FR) OTS price $6.60

Aeronautical Chart and Information Center, St. Louis, Mo.
GEODESY FOR THE LAYMAN,
by R. K. Burkard. Oct 59, rev. Sep 62, 64p.
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Geodesics, Textbooks), Astronomical geodesics, Earth, Position finding, Gravity.

The basic principles of geodesy and geodetic surveying are presented in an elementary form. The formation of geodetic datums is introduced and the necessity of connecting or joining datums is discussed. Methods used to connect independent geodetic systems to a single world reference system are discussed. Particular emphasis is placed on the contribution of the Air Force in developing a World Geodetic System. (Author)

AD-415 045 Div. 2
(TISTP/FR) OTS price $3.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
ATMOSPHERIC ENVIRONMENT FOR PERSHING MISSIL-410,
by Hubert D. Bagley and Novella S. Billions.
16 July 63, 30p.
Proj. 1B2 79191D678
AMC RR TR63 20
Unclassified report

Descriptors: (*Meteorological parameters, Flight testing), Guided missiles (Surface-to-surface), Flight testing, Temperature, Humidity, Barometric pressure, Wind, Clouds, High altitude.

The atmospheric environment is given for the flight of PERSHING Missile-410, which was launched on 21 March 1963, at 2015 EST, from the Atlantic Missile Range, Cape Canaveral, Florida. The general synoptic situation for the flight area, surface observations at launch time, and upper air conditions as measured by rawinsondes released as close to missile launch time as possible are given. High altitude wind data over the launch area as determined from a meteorological rocket flight are also presented. Relative deivations of thermodynamic quantities from the Patrick Air Force Base Annual Reference Atmosphere are presented in graphical form for easy reference. (Author)

AD-415 082 Div. 2
(TISTM/TLG) OTS price $6.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
A STUDY OF THE HARMONIC DESCRIPTION OF THE GEOMAGNETIC FIELD AT SATELLITE ALTITUDES,
by F. T. Heuring. July 63, 1v. Rept. no. TG506
Contract NOw62 0604
Unclassified report

Descriptors: (*Terrestrial magnetism, Harmonic analysis), Atmosphere, Magnetic fields, Mathematical models.

The study shows that it is possible to describe the geomagnetic field with less harmonic coefficients than heretofore used without reducing the accuracy of the approximation because of their smallness and subsequent reduction with increasing altitude. Further, a method of detecting poorly defined harmonic coefficients is set forth, as well as a brute force method of improving these coefficients. (Author)

AD-415 114 Div. 2, 25
(TISTP/FEM) OTS price $1.10

Cornell U., Ithaca, N. Y.
THEORETICAL RESEARCH IN ASTROPHYSICS.
Final status rept., 1 Apr 62-31 Mar 63,
by T. Gold. May 63, 5p. Rept. no. CRSR144
Grant AFOSR62 191
AFOSR 4975 Unclassified report

Descriptors: (*Astrophysics, Theory), (*Space environmental conductance, Molecular association), Hydrogen, Dissociation, Models (Simulation), Digital computers, Helium, Stars, Scattering, Emissivity, Photons, Polarization, Intensity, Lasers, Relativity theory, Plasma medium, Drag, Charged particles, Dust.

AD-415 181 Div. 2
(TISTP/FR) OTS price $2.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
THE DYNAMIC STRATOSPHERE,
by Willis L. Webb. Aug 63, 19p.
DA Task 1G6 50212A127 03
AERDA Rept. no. 62 Unclassified report

Descriptors: (*Stratosphere, Atmospheric motion), Atmospheric motion, Wind, Temperature.

Our knowledge of the kinetic and thermal structure of the upper atmosphere has expanded rapidly with the advent of synoptic observations in the stratosphere by the Meteorological Rocket Network. Over 2000 profiles of stratospheric wind structure plus numerous temperature and density soundings have been accumulated during the past five years. Analysis of the data has revealed the stratosphere to be an active region, with a well-developed westerly flow of strong variable winds during the winter portion of the year and quite steady moderate easterly winds during the summer season. The reversals appear to originate at high altitudes and work downward. The thermal structure shows much detail, with a warm lower and a cold upper stratosphere the rule in the polar winter. Great detail is observed in the structure of the stratosphere, and more frequent observation will be required before a complete picture can be assimilated. (Author)

AD-415 249 Div. 2
(TISTM/AMS) OTS price $1.10

Chicago U., Ill.
THEORETICAL INVESTIGATIONS OF THE EXPANSION OF THE H II REGIONS.
Final rept., 1 Apr 62-31 Mar 63,
by Peter O. Vandervoort. 1 Aug 63, 6p.
Grant Nonr G00042 62, Proj. NR046 794
Unclassified report

Descriptors: (*Stars, Interstellar matter), (*Interstellar matter, Hydrogen), (*Astronomy, Interstellar matter), Ionization, Gases, Ions, Mathematical models, Mathematical anlysis, Theory, Astrophysics.

AD-415 255 Div. 2, 25, 4
(TISTM/AMS) OTS price $7.60

Little, Arthur D, Inc., Cambridge, Mass.
THE EFFECT OF PRESSURE ON THE ELECTRICAL CONDUCTIVITY OF SEA WATER,
by R. A. Horne and G. R. Frysinger. Aug 62, 65p.
RN1270862
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Report on Proj. trident.

Descriptors: (*Sea water, Electrical conductance), (*High pressure research, Sea water), Salinity, Temperature, Test methods, Test equipment, Chlorine, Experimental data, Physical properties, Chemical properties, Pressure, Potassium compounds, Chloride.

AD-415 262 Div. 2
(TISTP/FR) OTS price $7.60

Little, Arthur D., Inc., Cambridge, Mass.
ENGINEERING PROPERTIES OF MARINE SEDIMENTS.
Technical rept.
Dec 62, 72p. Rept. no. 1281262
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Project TRIDENT.

Descriptors: (*Sedimentation, Ocean bottom), Ocean bottom, Soils, Permeability, Compressive properties, Shear stresses, Engineering geology.

Ocean-bottom sediments are considered from the point of view of emplacing or mooring structures. Bottom topography and sediment distribution around the North American continent are surveyed in detail. Soil mechanics concepts such as shear strength, compressibility, permeability, porosity and void ratio are introduced and used as a framework for discussing the sparse quantitative information concerning the engineering properties of bottom sediments. The low bearing capacities (often less than 1/2 p.s.i.) and high compressibilities of the sediments are seen to be particularly striking when compared with dry land values. The implications of these numerical data for ocean-bottom engineering are considered, and two programs, one minimal, the other ideal, for future sediment investigations are recommended. (Author)

AD-415 263 Div. 2, 4
(TISTP/WH) OTS price $5.60

Little, Arthur D., Inc., Cambridge, Mass.
ELECTRICAL CONDUCTIVITY, COMPRESSIBILITY, AND VISCOSITY OF AQUEOUS ELECTROLYTIC SOLUTIONS.
Technical rept.
Feb 62, 50p. Rept. no. 1180262
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Report on Project TRIDENT.

Descriptors: (*Electrolytes, Solutions), (*Solutions, Electrolytes), (*Sea water, Solutions), Physical chemistry, Electrical conductance, Compressive properties, Viscosity.

As part of the TRIDENT effort in the general area of ocean environment, the literature data on electric conductivity, compressibility, and viscosity of sea water have been reviewed and collected. These physical properties affect such

processes as galvanic corrosion, the operation of sea-return cables, and the performance of seawater-activated batteries. Although experimental values are not available over the full range of temperatures, pressures, and concentrations encountered in the oceans, they can often be estimated from the corresponding values for pure single electrolytes. Data for pure electrolytes may also prove useful, for example, in predicting the performance of electrolytic cells exposed to deep-sea pressures. A short explanatory section provides a minimal background for interpreting the tables and figures. Since current theory does not predict adequately the properties of any but very dilute solutions, this report emphasizes experimental results and empirical formulae. (Author)

AD-415 287 Div. 2
(TISTP/WH) OTS price $7.60

Little, Arthur D., Inc., Cambridge, Mass.
APPLICATION OF ADAPTIVE SAMPLING STRATEGIES TO THE PLANNING OF SURVEYS.
Technical rept.
June 63, 69p. Rept. no. 1340663
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Project TRIDENT.

Descriptors: (*Hydrographic surveying, Ocean bottom), (*Ocean bottom, Hydrographic surveying), Mapping, Numerical methods and procedures, Series, Mathematical prediction, Programming (Computers), Analysis of variance.

The results are presented of a preliminary investigation of the degree to which the nonuniform spacing of measured points can result in improved efficiency, relative to mapping, of the data collection, or survey, process. A simple type of survey, in which one physical property is measured at discrete intervals along a given path, is considered in detail. All measurements are made during one pass along the path; no 'backtracking' is allowed. It is shown that the efficiency of this type of survey can be improved by adapting the distance between adjacent measurements to the degree of nonuniformity of the physical property being surveyed. For some situations of interest, the potential saving in survey points is of the order of 50%. A control system is developed which utilizes data as it is collected in the survey process to adapt the sampling rate in an appropriate fashion. Tests of the control system show that approximately 50-60% of the potential increase in survey efficiency can be realized in practice. (Author)

AD-415 322 Div. 2
(TISTP/FR) OTS price $12.00

Free U., Berlin (Germany).
THE RELATIONSHIP BETWEEN TOTAL CLOUD AMOUNTS AND OBJECTIVELY DEFINED SYNOPTIC PARAMETERS.
by J. R. Clauss. 15 Feb 63, 30p. Technical note no. 1
Contract AF61 052 544
AFCRL 63 868 Unclassified report

Descriptors: (*Cloud cover, Meteorological parameters), Meteorological parameters, Wind, Barometric pressure, Anticyclones, High altitude.

From records and weather maps of 1200 GMT, total cloud amount and 13 objectively defined synoptic parameters were determined at 14 stations in Central and Eastern Europe for each day of the period 1956-60. Statistical correlations between total cloud amount and each single, or several, of these parameters were investigated by seasons with the help of IBM data processing. The results give a detailed survey about the state of sky over Central and Eastern Europe in the early afternoon and offer valuable aids for short- and middle-range forecasting of total cloud amount. (Author)

AD-415 332 Div. 2
(TISTM/AMS) OTS price $8.10

Columbia U., New York.
STATIC AND DYNAMIC RESPONSE OF GRANULAR SOILS. PART I AND PART II.
by Donald M. Burmister and Robert D. Stoll.
Feb 63, 75p. Technical rept. no. 1
Contract NBy32198
Unclassified report

Descriptors: (*Soil mechanics, Loading (Mechanics), Test methods, Test equipment, Soils, Tests, Stresses, Shear stresses, Identification, Density, Permeability, Dynamics, Statics, Experimental data.

Part I of this research deals with two types of triaxial tests where consolidation or prestress loading is applied, (1) while maintaining a constant ratio of principal stresses or (2) while maintaining zero radial strain. A set of fundamental static triaxial stress-strain and shear strength performance ratings are developed based on the controlling influences of soil identification, relative density, and triaxial prestress and load history. Part II covers development of apparatus for studies of wave propagation in a confined sand column with the input supplied by an air pulse from a pneumatic shock tube. (Author)

AD-415 356 Div. 2, 25
(TISTP/JP) OTS price $7.60

Oslo U. (Norway).
STUDIES IN AURORAL SPECTROSCOPY.
Final rept.
30 June 63, 72p.
Contract AF61 052 252
AFCRL 63 854 Unclassified report

Descriptors: (*Aurorae, Spectroscopy), (*Spectroscopy, Aurorae), Line spectrum, Band spectrum, Interferometers, Molecular spectroscopy, Resonance scattering, Nitrogen, Electron beams, Ions, Electrons, Luminescence, Hydrogen, Excitation, Magnetic storms, Terrestrial magnetism, Ionospheric disturbances.

Contents: Studies of Auroral Lines by means of Bafry-Perot Interferometers, Investigations of the State of Polarization of the red and green O-Lines in Polar Aurorae, The Luminosity Curve of high Aurorae, Studies of rapid Variations of certain Lines and Bands in the Auroral Spectrum, The Hydrogen Lines in Aurora, Velocities of very active Auroral Rays, The compensated Michelson's Interferometer and its Use in Auroral Spectroscopy in the near Infra-red, The Discharge Theory of the Nightglow Emission OI 5577 A, Observations and Experiments pertinent to auroral Theories, Excitation of the A10-bands in the Sunlit Atmosphere and Temperature Determinations from the vibrational Levels, and Observations of enhanced Radiation in the kc/s-band (5 and 8 kc/s) during Aurorae and Geomagnetic Disturbances.

AD-415 366 Div. 2, 13
(TISTE/JBM) OTS price $4.60

Bureau of Reclamation, Denver, Colo.
CONTROL OF ALLUVIAL RIVERS. BY STEEL JETTIES,
comp. by E. J. Carlson and R. A. Dodge, Jr.
15 Oct 62, 21p. Hydraulics branch rept. Hyd. 503
Unclassified report

Presented at First Water Resources Conference, American Society of Civil Engineers, 14-18 May 62, Omaha, Neb.

Descriptors: (*Rivers, Structures), (*Sedimentation, Rivers), Steel, Models (Simulations), Fluid flow, River currents, Velocity, Tables.

Both model and prototype studies indicated that jetty fields are successful in alining rivers that carry appreciable amounts of suspended sediments. To compute the relative rate of sediment deposition, field data are required. The use of point data analysis, described in this report, aids greatly in extending field data and establishing river characteristic curves. To determine the design discharge, it is recommended that width and depth be plotted versus flow area and that a value be selected which corresponds to the flow area having the maximum scatter or deviation of data points with respect to depth and width. This is the lowest discharge which will be difficult to control. The average river width corresponding to this discharge should be used for the design channel width. The relative rate of deposition in a jetty field installation can be computed by the procedure demonstrated in this paper. However, future studies may indicate desirable modifications and refinements in the procedures. (Author)

AD-415 367 Div. 2
(TISTM/EJH) OTS price $4.60

San Andres U., La Paz (Bolivia).
STUDY OF VARIATIONS AND SOLAR MODULATIONS.
Final technical rept.,
by Ismael Escobar V. Oct 62, 19p. Rept. no. 20
Grant AF AFOSR 60 13
Unclassified report

Descriptors: (*Cosmic rays, Intensity), (*Solar radiation, Cosmic rays), (*Atmosphere, Cosmic rays), Solar flares.

Mechanisms by the sun controls the intensity of cosmic radiation sampled at the earth are the subject of this investigation. The work performed at this institute was divided into 2 parts. First, the continuous recording of various components of the cosmic ray intensity with a variety of instruments. Second, the analysis and interpretation of the results, generally devoted to the study of Forbush decreases. Data for this analysis was obtained from the instruments at Chacaltaya and supplemented it with results from several others institutions. (Author)

AD-415 385 Div. 2
(TISTP/FR) OTS price $2.60

Uppsala U. (Sweden).
EXPERIMENTAL EVIDENCE OF A DIRECTIONAL EVENT DURING THE COSMIC RAY STORM IN DECEMBER 1957,
by Oscar L. Troncoso. May 63, 1v. Technical note no. 2
Contract AF61 052 614
AFCRL 63 855 Unclassified report

Descriptors: (*Cosmic rays, Magnetic storms), Magnetic storms, Terrestrial magnetism, Sunspots, Solar flares, Nucleons, Mesons.

On December 22-24, 1957, a significant cosmic ray increase of short duration took place in the interval between two moderate magnetic storms and during the recovery of a cosmic ray storm. Data were used from 24 cosmic ray stations distributed all over the world. The increase was observed only by stations contained within a limited region of the earth's surface. The increase, which lasted for about 14 hours, took place at about the same local time for all stations which detected it. The average direction of the arriving particles corresponded to 10 hours LT. A second peak, occurring at all stations at about 03 LT, is interpreted as a continuation of the effect generating the first increase. Characteristic features of both increases are presented together with data of solar and terrestrial activity. There is no clear correlation between the occurrence of these peaks and such activities. The modulation mechanism producing the increase, is discussed. (Author)

AD-415 428 Div. 2
(TISTM/AMS) OTS price $8.60

Naval Research Lab., Washington, D. C.
MEASUREMENTS OF ATMOSPHERIC ELECTRIC CONDUCTIVITY AND FIELD IN THE SHENANDOAH NATIONAL PARK, VIRGINIA,
by R. V. Andereson and Eva Mae Trent. 13 July 63, 93p.
NRL Rept. 5983 Unclassified report

Descriptors: (*Atmosphere, Electrical properties), Electric fields, Electrical conductance, Atmospheric electricity, Data, Test equipment.

A program for the measurement of atmospheric electric conductivity and field was established by the U.S. Naval Research Laboratory in 1954 in the Big Meadows area of the Shenandoah National Park, Virginia. The purpose of the program was to determine relative magnitudes and time dependence of the atmospheric electric variables. The instrumentation was composed of electric field meters, conductivity chambers, accompanying amplifiers and timers, and peripheral equipment necessary to produce continuous recordings of the electric field and conductivity of the atmosphere Data from November 23, 1954, to October 21, 1956, are presented in tabulated and graphic form. The data include daily, monthly, and seasonal hourly averages of total atmospheric electric conductivity, ratio of the two polar conductivities, electric field, and computed conduction current density. (Author)

AD-415 437 Div. 2
(TISTP/JP) OTS price $5.60

Aerospace Corp., Los Angeles, Calif.
THE EFFECTS OF UNCERTAINTIES IN SOME ZONAL HARMONICS OF THE EARTH'S GRAVITY POTENTIAL ON SATELLITE POSITION DETECTION,
by P. T. Guttman. 26 July 63, 35p. Rept. no. TDR269 4110 2
Contract AF04 695 269
SSD TDR63 174 Unclassified report

Descriptors: (*Gravity, Polar orbit trajectories), (*Polar orbit trajectories, Gravity), (*Satellites (Artificial), Detection).

An investigation was conducted to determine the effects of the omission or inclusion of some of the more important zonal harmonics of the earth's gravity potential, and the uncertainties in the coefficients of these harmonics, on satellite position prediction errors. The position errors which were studied are those which would result from the generation of an ephemeris based on a faulty or incomplete gravitational model. The nature of the propagation of the errors along the orbit, the magnitude of the errors to be expected, and the dependency of these errors on the initial elements of the orbit and on the location at which observations are made for prediction purposes, are presented. Position prediction errors due to other causes such as atmosphere uncertainty, are not investigated. The investigation is based on a first order analytical formulation of the problem of satellite motion about the asymmetric earth. In order to demonstrate the more salient features of the problem under investigation and to facilitate the mathematical analysis, the investigation is restricted to nearly circular, polar orbits. (Author)

AD-415 483 Div. 2
(TISTP/FR) OTS price $3.60

Emmanuel Coll., Research Language Center, Boston, Mass.
IONIZATION OF THE UPPER ATMOSPHERE BY SHORT-WAVE SOLAR RADIATION (Ionizatsiia verkhnei atmosfery korotkovolnovym izlucheniem solntsa),
by Ivanov-Kholodnyi, tr. by Zanis Stuberovskis.
Feb 63, 33p.
Contract AF19 604 8505
AFCRL Trans. no. ETR63 1
Unclassified report

Trans. from Geomagnetizm i Aeronomiia, 2:4, pp. 674-687, 1962.

Descriptors: (*Ionosphere, Ionization), Ionization, Solar radiation, Electron density, Recombination reactions.

Taking into account new data about the energy and spectrum of short-wave solar radiation, the absorption of radiation and the rate of ion-formation in the atmosphere at heights of 100-800 km were calculated for different times of the day. The peak of ionformation was detected at a height of about 120 km, and the diurnal variation of h sub e in the E, F1 and F2 regions were explained. The effect of the daytime increase in the density of the upper atmosphere (asymmetric with respect to midday) was examined; this made it possible to explain a number of ionospheric effects. Conclusions were drawn concerning the value of the effective coefficient of recombination. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-414 109 Div. 4, 25
(TISTM/TCG) OTS price $.50

Air Force Inst. of Tech., School of Logistics, Wright-Patterson Air Force Base, Ohio.
IDENTIFICATION OF BRANCHED-CHAIN FATTY-ACIDS BY NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY.
Final rept., Aug 62-Feb 63,
by Robert L. Buchenauer. July 63, 6p.
Proj. 7360, Task 736005
ASD TDR63 513 Unclassified report

Report on Materials Analysis and Evaluation Techniques.

Descriptors: (*Fatty acids, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Fatty acids), (*Organic compounds, Fatty acids), Aliphatic compounds, Carboxylic acids, Molecular structure, Molecular isomerism, Molecular weight, Protons, Molecular spectroscopy.

The nuclear magnetic resonance spectra of twenty branched-chain fatty acids were studied in order to identify the structure of isomeric aliphatic carboxylic acids of low molecular weight. The effect of chemical shift of methyl protons as a function of distance from the carboxyl group is discussed. (Author)

AD-414 391 Div. 4, 14
(TISTM/EJH) OTS price $36.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ORGANIC SILICON COMPOUNDS (KREMNIYORGANICHESKIYE SOEDINENIYA),
by K. A. Andrianov. 1963, 910p.
FTD Rept. no. F TS9191 5
Unclassified report

Trans. from Chemical Literature Moscow, 1955.

Descriptors: (*Silicone plastics, Synthesis (Chemistry)), (*Silanes, Synthesis (Chemistry)), (*Siloxanes, Synthesis (Chemistry)), (*Heat resistant plastics, Silicone plastics), (*Organic compounds, Silicone compounds), (*Reviews, Silicon compounds), Polymers, Elastomers, Metalorganic compounds, Physical properties, Chemical properties, Bibliographies, Dielectric properties, Halogen compounds, Embedding substances, Documentation, Esters, Organic nitrogen compounds, Organic sulfur compounds.

This book is a monograph on the chemistry of organosilicon compounds and is intended for scientists, engineering and technical personnel of plant laboratories, instructors, post-graduate students, and students of higher educational institutions. This book contains information on the methods of preparation, physical and chemical properties of a large number of monomeric organosilicon compounds, as well as the methods of preparation, propenties and applications of high-polymer organosilicon compounds. (Author)

AD-414 491 Div. 4, 25
(TISTM/EJH) OTS price $1.00

National Carbon Co., Inc., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE

MATERIALS. VOLUME XVI. AN ELECTRON SPIN RESONANCE STUDY OF THERMAL DECOMPOSITION REACTIONS OF ORGANIC COMPOUNDS.
by L. S. Singer and I. C. Lewis. June 63, 24p.
Contract AF33 616 6915, Projs. 7350 and 7381, Tasks 735002 and 738102
WADD TR61 72, vol. 16 Unclassified report

Descriptors: (*Organic compounds, Decomposition). (*Decomposition, Organic compounds). (*Pyrolysis, Organic compounds). (*Graphite, Organic compounds). Hyperfine structure, Electrons, Spin, Resonance, Free radicals, Organic nitrogen compounds, Polycyclic compounds, Organic solvents, High-temperature research, Aromatic compounds, Deuterated compounds, Spectra (Infrared) Spectra (Visible and ultraviolet), Chemical reactions.

Initial results of an ESR (electron spin resonance) survey of the thermal decomposition and carbonization of pure organic compounds are presented. ESR measurements were performed during pyrolysis in inert polyphenyl solvents to permit observation of resolved hyperfine structure of radical intermediates. The generality of radical formation during carbonization is demonstrated. Detailed investigations were made on the model aromatic hydrocarbons, acenaphthylene, 9,9'-bifluorenyl and 9,9'-bifluorylidene which provide examples of extremes in graphitization behavior. Results are discussed in terms of reaction mechanisms and the nature of radicals in low temperature carbons. Resolved spectra for acenaphthylene and two deuterated analogs are compared. ESR studies are reported for thermal decomposition of several aromatic diazocompounds. The observed stable radical intermediates are believed to result from further reaction of the initially generated carbene species. (Author)

AD-414 546 Div. 4, 25
(TISTM/ODN) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
A STUDY OF VACUUM CRYOSORPTION BY ACTIVATED CHARCOAL,
by S. M. Kindall. Aug 63, 35p.
Proj. SW2204
AEDC TDR63 170 Unclassified report

Descriptors: (*Adsorption, Cryogenics), (*Cryogenics, Adsorption), (*Charcoal, Adsorption), Low pressure research, Gases, Vacuum apparatus, Temperature, Pressure, Volume, Experimental data, Equations of state, Nitrogen, Oxygen, Argon, Helium, Hydrogen.

An experimental program was carried out in the 10 to the -8 to 10 to the -2 power torr region to supply basic information on the adsorption of noncondensable gases at 77 K and to establish the functional dependence of adsorption rate on pressure and amount of gas adsorbed. From the experimental results, analytical expressions are developed which describe the behavior of adsorption rate in terms of the adsorption parameters for high vacuum, low temperature conditions. These expressions are shown to agree with the observed pressure-time variations resulting from charcoal adsorption provided the charcoal remains well below saturation. (Author)

AD-414 700 Div. 4, 8, 26
(TISTM/BRW) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
ELECTROLESS NICKEL DEPOSITION APPLICATION TO MICROELECTRONICS,
by Clyde H. Lane. June 63, 24p.
Proj. 5578, Task 557804
RADC RAS TM63 4 Unclassified report

Descriptors: (*Nickel, Plating), (*Electronic equipment, Microminiaturization), (*Metal films, Production), Nucleation, Resistors, Solutions, Cleaning, Films, Thickness, Catalysts, Chemical reactions, Nickel compounds, Chlorides, Sodium compounds, Phosphites, Nickel alloys, Phosphorus alloys, Impurities, Additives.

This report describes in-house investigation relative to the application of electroless nickel plating to the fabrication of microelectronic passive components. The results of this work indicate that this method of thin film deposition is not capable of providing good quality, reproducible resistors at this time. An extensive literature survey on which the laboratory work was based is also included. (Author)

AD-414 801 Div. 4
(TISTM/REB) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CATALYTIC ACTIVITY OF ORGANIC POLYMERS,
by N. P. Keyer and G. K. Boreskov. 21 June 63, 18p.
FTD TT63 414 Unclassified report

Trans. from Kinetika i Kataliz, 3:5, pp. 680-690, 1962.

Descriptors: (*Organic compounds, Catalysts), (*Polymers, Catalysis), (*Metal organic compounds, Polymers), Complex compounds, Electrical conductance.

The prupose of this investigation was a broader examination of laws governing catalytic activity in relation to the chemical composition of atoms connected with the metal in the chelate joint, and also to compare catalysis over chelate polymers and chelate complex compounds, which appear to be monomeric analogues of chelate polymers. (Author)

AD-414 849 Div. 4
(TISTM/REB) OTS price $1.10

Olin Mathieson Chemical Corp., New Haven, Conn.
THE STRUCTURE OF ISOCARBONANE,
by Hansjuergen Schroeder and George D. Vickers.
Aug 63, 3p. Technical rept. no. 19
Contract Nonr339500, Proj. NR356 431
Unclassified report

Descriptors: (*Organoboranes, Stereochemistry), Nuclear magnetic resonance, Molecular structure.

The B-11 NMR spectrum of isocarborane was examined. It consists of three doublets which can be decoupled into singlets by irradiating with a saturating 60 Mc. field. Since the overlapping of the doublets did not permit the area measurement required for the structure determination, the novel decachloroisocarborane was synthesized by direct chlorination of siocarborane in refluxing carbon tetrachloride in 90% yield. Iso-B10C110C2H2 exhibited the expected three singlets with an area ratio of 2:6:2. Since these findings were consistent with the requirements described above for the meta configuration, this structure is proposed for isocarborane. (Author)

Division 4 - CHEMISTRY

AD-414 857 Div. 4
(TISTM/EJH) OTS price $1.60

Emmanuel Coll. Research Language Center, Boston, Mass.
INVESTIGATIONS IN A PYRIDYLTHIAZOLYLMETHANE SERIES (Issledovaniia v riadu piridiltiazolilmetana),
by V. G. Ermolaeva and M. N. Shchukina. Apr 63, 17p. Trans. ETR63 5
Contract AF19 604 8505

Unclassified report

Trans. from Zhurnal Obshchei Zhimii, 32, pp. 2664-2670, 1962.

Descriptors: (*Organic compounds, N-Heterocyclic compounds), S-Heterocyclic compounds, Spectra (Visible and unvisible), Paramagnetic resonance, Chemical properties, Molecular structure, Carbonyl group.

AD-414 909 Div. 4, 25
(TISTM/TCG) OTS price $2.60

Dow Chemical Co., Midland, Mich.
MASS SPECTRAL STUDIES BEHIND SHOCK WAVES. II. THE THERMAL DECOMPOSITION OF HYDRAZINE,
by R. W. Diesen. Aug 63, 23p. AR3S63
Contract Nonr381400

Unclassified report

Descriptors: (*Hydrazine, Decomposition), (*Mass spectrum, Hydrazine), (*Shock waves, Hydrazine), (*Reaction kinetics, Shock waves), Dissociation, Chemical reactions, Nitrogen, Hydrogen, Ammonia, Free radicals, Mass spectroscopy, Argon, Controlled atmosphere, Recombination reaction.

The decomposition of hydrazine, diluted in Ar, has been studied over the temperature range 1200 to 2500 K. and pressure range 0.04 to 0.25 atm using a shock tube coupled to a time-of-flight mass spectrometer. The time resolved mass spectra (25 microseconds) enable the simultaneous identification and determination of N_2H_4, NH_3, N_2, H_2 and the NH_2 radical, the five major species observed. The material balance is within the experimental error (10%) during reaction up to complete decomposition. The primary process in the dissociation of hydrazine is shown to be the rupture of the N-N bond to give NH_2 radicals. The observed rate constants for the disappearance of hydrazine are those expected of a unimolecular reaction at or near the second order region where collisional activation is rate controlling. (Author)

AD-414 933 Div. 4, 25, 14
(TISTM/REB) OTS price $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
MORPHOLOGY OF POLYETHYLENE CRYSTALLIZED FROM THE MELT UNDER PRESSURE,
by Phillip H. Geil, Franklin R. Anderson, Bernhard Wunderlich and T'amio Arakawa.
31 July 63, 13p. Technical rept. no. 5
Contracts Nonr401 44 and Nonr591 19, Task NR051 428

Unclassified report

Descriptors: (*Polyethylene plastics), Crystals), (*Polymers, Crystal structure), Crystallization, Pressure, Electron microscopy, Fracture (Mechanics), Electron diffraction analysis, Growth.

The morphology of linear polyethylene crystallized under pressures up to 5300 atmospheres has been investigated. Electron micrographs of fracture surfaces obtained from these samples show that the majority of the polymer, at the highest pressures, crystallizes in the form of extended chain lamellae which can be as thick as 3 microns. Electron diffraction patterns show that the molecules are normal to the lamellae. At lower pressures part of the polymer crystallizes in the form of folded chain lamellae, the proportion increasing with decreasing pressure. Well defined kink bands can be observed in the thicker extended chain lamellae. It is suggested that either molecular weight fractionation, or an end to end alignment of the molecules and subsequent folding, takes place during the growth of the extended chain lamellae. (Author)

AD-414 934 Div. 4
(TISTM/REB) OTS price $2.60

George Herbert Jones Lab., U. of Chicago, Ill.
THE FORMATION OF BIPHENYLS FROM DERIVATIVES OF BENZENE-1,4-DIAZOOXIDE; ELECTROPHILIC SUBSTITUTION AND THE CARBENE PROBLEM 1,
by Michael J. S. Dewar and K. Narayanaswami. 1963, 25p.
Contract Nonr2121 21

Unclassified report

Descriptors: (*Organic compounds, Pyrolysis), Synthesis (Chemistry), Substitution reactions, Reaction kinetics, Polymerization, Polymers, Aromatic compounds, Phenols, Chemical reactions, Denterated compounds, Decomposition, Labeled substances.

Earlier work has shown that the thermal decomposition of derivatives of benzene-1,4-diazooxides in benzene, or in derivatives of benzene, in presence of catalytic amounts of alcohol gives derivatives of 4-hydroxybiphenyl in good yield. This reaction has been reexamined in detail ant the indication is that it does not involve a free radical mechanism. Decomposition of the diazooxide gives a carbene which attacks the aromatic substrate. The process is essentially an electrophilic substitution, the first step in which is the formation of a pi-complex or spiran. The bearing of this on the mechanism of electrophilic aromatic substitution is discussed. (Author)

AD-414 945 Div. 4, 13
(TISTM/BRW) OTS price $1.10

MSA Research Corp., Callery, Pa.
EXTINGUISHMENT OF ALKALI METAL FIRES.
Quarterly progress rept. no. 5, 16 Mar-15 June 63, by S. J. Rodgers. 1 Aug 63, 3p. Rept. no. MSAR 63 112
Contract AF33 657 8310

Unclassified report

Descriptors: (*Alkali metals, Fires), (*Fires, Fire extinguishers), Ignition, Combustion, Pressure, Oxygen, Foams, Expanded plastics, Isocyanate plastics, Sodium, Sodium alloys, Potassium alloys, Lithium, Salts.

An investigation was made of agents and techniques for extinguishment and control of fires resulting from leakage of high temperature and high pressure alkali metals under sea level and reduced atmospheric pressure environments. Characteristics of ignition and combustion at various absolute pressures and partial pressures of oxygen are an integral part of this investiga-

tion. Additional tests have been made with TEC powders. Results with this material are very encouraging. Work continued on the development of a suitable foam applicating system for alkali metal fires but a suitable system was not devised. (Author)

AD-414 977 Div. 4
(TISTM/TCG) OTS price $1.60

Stauffer Chemical Co., Richmond, Calif.
HIGH ENERGY OXIDIZERS.
Quarterly Technical Summary rept. no. 2, 1 May-1 Aug 63,
by K. O. Christe and A. E. Pavlath. Aug 63, 7p.
Contract Nonr4019 00, Proj. NR093 035; ARPA Order no. 399 42
Unclassified report

Descriptors: (*Complex compounds, Chlorine compounds), (*Fluorine compounds, Chlorine compounds), (*Chlorine compounds, Fluorine compounds), (*Oxidizers, Complex compounds), Chemical reactions, Solubility, Nuclear magnetic resonance, Spectra (Infrared), Purification, Vacuum pumps, Bromine compounds, Potassium compounds, Arsenic compounds, Bromides, Fluorides, Sulfur compounds, Oxides, Solvents.

This report is on the investigation of complexes of chlorinetrifluoride. Further modification was made on the vacuum line, mostly to make its operation more safe. This was necessitated by an explosion experienced during the last report period. Oleum, fluorosulfonic acid, sulfurtrioxide and BrF5 were investigated as possible solvents for the complexes in the NMR studies. The first three gave chemical interactions, while BrF5 exchanged fluorine with the complexes. Low temperature NMR work was attempted, but the results were not reproducible because of mechanical difficulties with the NMR. Infrared studies were made on ClF3, AsF5 (both in solid and gas-phase), KAsF6 and ClF2+AsF6-. Different windows were used and the application of 6Br coated with a thin Kel-F layer was found to be the most suitable among the possible solutions. Definite proof was obtained for the presence of the AsF6-. (Author)

AD-414 984 Div. 4
(TISTM/EJH) OTS price $1.10

California Inst. of Tech., Pasadena.
CONFORMATIONAL STUDIES OF CYCLOBUTANE SYSTEMS,
by Joseph B. Lambert and John D. Roberts. July 63, 6p.
Contracts Nonr22026 and NR055 388
ONR Technical rept. no. 24 Unclassified report

Descriptors: (*Organic compounds, Stereochemistry), (*Stereochemistry, Organic compounds), Nuclear magnetic resonance, Dipole moments, Halogenated hydrocarbons, Polycyclic compounds, Cycloalkanes, Fluorine compounds, Molecular structure, Halogen compounds.

The object of the present work was to devise a fairly general, but still straightforward, method of detecting the presence and determining the magnitude of puckering in substituted cyclobutane rings, and to ascertain whether the results could be interpreted in terms of an equilibrium between axial (I) and equatorial (II) conformations. The n.m.r. method determines the presence or absence of planarity and the dipole-moment method determines the magnitude of puckering. Investigations are in progress to combine these methods in order to predict the angle of puckering in all cases studied. (Author)

AD-415 009 Div. 4, 25
(TISTP/ODN) OTS price $1.60

Imperial Coll. of Science and Tech., London (Gt. Brit.).
ADSORPTION AND SORPTION COMPLEXES.
Final technical rept., 1 July 62-30 June 63,
by J. L. Whiteman. 30 June 63, 12p.
Contract DA91 591euc2465
Unclassified report

Descriptors: (*Adsorption, Sulfur), (*Sorption, Sulfur), (*Sulfur, Adsorption), Silicates, Phosphorus, Mercury, Vapors, Crystal structure, Calcium compounds, Sodium compounds, Experimental data, Silver compounds.

It was shown that sulphur vapor is sorbed rapidly and copiously by the zeolites CaA and NaX. The uptake of the large cages in these zeolites is only about 75% of that expected from their volumes. This may be ascribed to steric difficulties encountered in packing large molecules into the cages. The sulphur uptake of natural chabazite is comparatively slow and limited in extent. Phosphorus is also strongly sorbed by NaX but in this case the approach to equilibrium is slow. Further investigations were conducted on the mercury uptake of silver ion-exchanged zeolites. Large uptakes were recorded with the zeolites having the more open structures and hysteresis loops obtained. The saturation uptakes of mercury are again insufficient completely to fill the structure, and further work is in progress to throw light on this interesting aspect. (Author)

AD-415 220 Div. 4
(TISTM/EJH) OTS price $1.60

Tulane U., New Orleans, La.
(No title).
Semi-annual progress rept. (Final) 1 Oct 60-30 June 63.
1 Aug 63, 11p.
Grants DA ORD31 124 61 G31 and DA ARO D 31 124 G389
AROD 2914 13 Unclassified report

Descriptors: (*Photochemistry, Molecular isomerism), (*Organic compounds, Photochemistry), (*Molecular isomerism, Photochemistry), Sterochemistry, Cycloalkanes, Halogenated hydrocarbons, Polycyclic compounds, Molecular spectroscopy, Esters, Synthesis (Chemistry), Chemical reactions, Carboxylic acids, Spectra (Infrared), Pyrolysis, Chemical bonds.

Direct irradiation of dimethyl fumarate in the solid state was shown to afford a single dimer cis,trans,cis-1,2,3,4-tetracarbomethoxycyclobutane. Isomerization of this dimer to the thermodynamically more stable trans,trans,trans tetraester is readily achieved thermally. Similar results were obtained with fumaronitrile and maleic anhydride. Photodimers of fumaric acid derivatives have provided ideal precursors for the synthesis of the novel nonbenzenoid system tetramethylenecyclobutane. Of these, dimethylfumarate dimer proved most practical from a synthetic standpoint. (Author)

5. COMMUNICATIONS

AD-414 104 Div. 5, 8
(TISTP/MFA) OTS price $9.60

Motorola Inc., Phoenix, Ariz.
COMPATIBLE TECHNIQUES FOR INTEHRATED CIRCUITRY.
Quarterly rept. no. 7, 1 Nov 62-31 Jan 63.
31 Jan 63, 108p.
Contract AF33 616 8276.
Unclassified report

Descriptors: (*Thin films (Storage devices), Design), (*Circuits, Semiconductors), (*Integrated circuits, Manufacturing methods), Silicon, Silicon compounds, Oxides, Electrical conductance, Diffusion, Electrical equipment, Materials, Resistors, Nickel compounds, Tantalum compounds, Nitrides, Capacitors, Tin compounds, Aluminum compounds, Silicates, Tests, Digital systems, Communications systems, Semiconducting films, Manufacturing methods.

The design and manufacturing flexibility to be attained through the combination of semiconductor and thin film technologies is presented. The utilization of a wide variety of materials to construct circuit elements provides wider range of component values to closer tolerances than can be achieved if only one technology and material is used. Furthermore, the component parasitic parameters such as temperature coefficients, voltage sensitivity and loss factors can be better controlled if more than one material is available to construct components. Of great importance is the electrical isolation of critical circuit elements which is achievable when thin film elements are combined with silicon elements. In summary, the principle advantages of a compatible thin film - single block silicon technology are listed. (Author)

AD-414 629 Div. 5
(TISTE/JWS) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
GROUND-AIR-GROUND DATA TRANSMISSION SYSTEMS TESTS,
by Adolph J. Uryniak. July 63, 21p.
RADC RAU TM63 2 Unclassified report

Descriptors: (*Data transmission systems, Frequency shift), (*Radio relay systems, Airborne), Diversity reception, Teletype systems, Narrowband, Frequency shift keyers, Errors, Reliability, High frequency, Tests.

Tests were conducted at RADC to check the feasibility of Air/Ground/Air Narrow Band FSK Data System utilizing frequency diversity and doppler correcting techniques. Results of air/ground/air data transmission tests are described in this report. These tests were conducted between RADC's Ava Test Annex and a KC-135 flying to California and Alaska. The equipment at both terminals used narrowband frequency shift keying, with frequency diversity and doppler correction, in conjunction with equipment currently in Air Force inventory. In addition, a solid-stage tape printer and a TDMS-5 sender were used. The teletypewriters were set to operate at 100 WPM (74.2 bauds/sec). It can be concluded from the test results that doppler-correcting narrowband techniques applied to frequency diversity operation in ground/air/ground data transmission is feasible, resulting in reliability and error rates equivalent to ground point-to-point systems operating within similar effective power ranges and antenna gains. (Author)

AD-414 686 Div. 5
(TISTE/CAM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF PREVENTING SIGNAL DISTORTIONS CAUSED BY MULTIPATH DISTRIBUTION DURING METEORIC COMMUNICATION,
by V. V. Sidorov. 25 July 63, 3p.
FTD TT63 434 Unclassified report

Trans. from Russian patent no. 147608 (Appl. nr. 726736/26-9, pp. 1-2, 17 Apr 61.

Descriptors: (*Radio signals, Meteors), (*Multipath transmission, Distortion), Coding, Propagation.

AD-414 723 Div. 5, 30
(TISTB/MS) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PEOPLE ORGANIZATIONS AND COMMUNICATIONS. NATIONAL SYMPOSIUM ON GLOBAL COMMUNICATIONS, AUGUST 1-3, 1960, WASHINGTON, D. C.,
by Joel N. Bloom and Benedict R. Jacobellis.
1963, 18p.
Contract DA36 039sc78332
Unclassified report

Descriptors: (*Communications systems, Military requirements), (*Operations research, Command and control systems), (*Errors, Control), Performance (Human), Military organizations, Effectiveness.

This paper deals with the development of a methodology for assessing the effectiveness of the human and organizational elements in military communication networks in terms of a trade off between the control of erro and the delay involved in error control. Since all information to be transmitted by the system does not inherently require equal freedom from error and delay, an information characterization scheme is introduced. Information is characterized in terms of its (a) urgency, (b) importance, and (c) policy status. Delay and error control are then measured and examined as functions of these information characteristics. Conceptually, messages are considered to flow from source commander to destination commander, with the action officers, releasing officers, staff message agencies, and the like considered as system elements. Total error and delay, and their interactions, are then measured from commander to commander. Individual error components are postulated to permit evaluation of the effectiveness of specific message processing phases, such as preparation, coordination, review, and release. Problems involved in the collection of data in an operating army headquarters and the development of specific instruments for route tracing and communications error and delay measurement are discussed in some detail. (Author)

AD-414 724 Div. 5, 30
(TISTB/MS) OTS price $3.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PEOPLE, ORGANIZATIONS AND COMMUNICATIONS. FIRST JOINT NATIONAL MEETING, OPERATIONS RESEARCH SOCIETY OF AMERICA AND THE INSTITUTE OF MANAGEMENT SCIENCES, NOVEMBER 8 - 10, 1961,
by Joel N. Bloom and Benedict R. Jacobellis.
1963, 18p.
Contract DA36 039SC78332
Unclassified report

Descriptors: (*Communication systems, Military requirements), (*Operations research, Command and control systems), (*Errors, Control), Effectiveness, Performance (Human), Military organizations.

This paper deals with the methodology, execution, and results of an empirical program for assessing the effectiveness of the human and organizational elements in military communication networks in terms of a trade off between the control of error and the delay involved in error control. As all information to be transmitted by the system does not inherently require equal freedom from error and delay, an information characterization scheme is introduced. Information is characterized in terms of its (a) urgency, (b) importance, and (c) policy status. The operating characteristics of the various system elements in terms of error and delay are then measured and examined in terms of homogeneous groupings of the information characteristics. Problems involved in the execution of the data collection program in operating Army headquarters are considered and a number of instruments for route tracing and delay and error measurement are discussed. Selected results are presented and their implications for the design of new systems discussed. (Author)

6. DETECTION

AD-414 185 Div. 6, 25, 26, 17
(TISTM/AMS) OTS price $4.60

Lansdale Div., Philco Corp., Pa.
PEM FOR GOLD-DOPED GERMANIUM INFRARED DETECTOR TYPE IR400.
Quarterly progress rept. no. 2, 27 Mar-27 June 62,
by D. Skvarna and R. J. Roode. 27 June 63, 1v.
Contract DA36 039 amc 01464, Proj. H 200
Unclassified report

Descriptors: (*Infrared detectors, Materials), (*Germanium, Infrared detectors), (*Single crystals, Germanium), Manufacturing methods, Gold, Impurities, Barium compounds, Fluorides, Glass seals, Metal seals, Silicon, Silicon compounds, Crystal growth, Experimental data, Resistance (Electrical), Crystal lattice defects, Density, Hall effect.

The reported work is on a PEM for producing p-type gold-doped germanium infrared detectors, Type Ir400. The report covers the second quarter of the contract period. The work for the period is divided into three main categories: gold-doped germanium crystal growing, material evaluation and testing, and barium fluoride transmission window sealing to glass. The procedures involved in material and device fabrication and testing are discussed. Evaluation data is included in tabular and graphic form. Problems encountered in device fabrication and testing and difficulties experienced in the barium fluoride sealing program are also discussed. (Author)

AD-414 228 Div. 6
(TISTP/JEA) OTS price $1.10

HRB-Singer, Inc., State College, Pa.
CLOSED LOOP NITROGEN-NEON COOLER.
Monthly status rept. no. 5 for June 63,
by John P. Walker, Jr. 8 July 63, 3p. Rept. no. 419 L 5
Contract AF33 657 10276, Proj. 419
Unclassified report

Descriptors: (*Infrared detectors, Refrigeration systems), (*Refrigeration systems, Infrared detectors), Cooling, Liquefied gases, Nitrogen, Neon, Cryostats, Infrared scanning.

The basic objective of this program is that of procuring a closed loop nitrogen-neon cooler with interchangeable Ge:Hg and InSb detectors. The technique by which this objective will be met was altered in April by supplement to the contract dated 15 April 1963. This supplement permits the use of a modified sterling cycle cooler to reach the required temperatures and waives the requirement that the compressor must be physically removed from the cryostat by at least 25 feet. (Author)

AD-414 331 Div. 6, 2, 8
(TISTP/FEM) OTS price $2.60

American Meteorological Society, Boston, Mass.
RADAR SCATTERING BY NON-SPHERICAL PARTICLES (Radiolokatsionnoe Rasseianie Nesfericheskimi Chastitsami),
by A. B. Supiatskii, trans. by Robert Magruder and ed. by David Kraus. Mar 63, 23p. Rept. no. TR402
Contract AF19 604 6113
Unclassified report

Trans. from Tsentral'naia Aerologicheskaia Observatoriia, Trudy, no. 30, pp. 39-52, 1959.

Descriptors: (*Meteorological radar, Absorption), (*Radio waves, Scattering), (*Radar reflectors, Ice), Crystals, Radar reflections, Electromagnetic waves, Particles, Electromagnetic wave reflections, Numerical analysis, Differential equations, Radar echo areas, Clouds, Atmosphere precipitation, Troposphere, Dipole moments, Polarization, Attenuation, Raindrops, Energy, Intensity.

AD-414 384 Div. 6, 2, 25
(TISTP/JEA) OTS price $15.50

Research and Advanced Development Div., AVCO Corp., Wilmington Mass.
RESEARCH ON AEROSOL SCATTERING IN THE INFRARED. Final rept.
by Rudolf B. Penndorf. June 63, 231p. TR RAD TR63 26
Contract AF19 604 5743, Proj. 7670, Task 76704
AFCRL 63 668 Unclassified report

Descriptors: (*Aerosols, Scattering), (*Infrared radiation, Scattering), (*Bibliographies, Infrared research), (*Scattering, Mathematical analysis), Numerical analysis, Intensity, Solar radiation, Dust, Ammonium compounds, Sulfates, Refractive index, Absorption, Spectra (Infrared), Particle size, Statistical analysis.

Theoretical studies have been carried out to investigate the scattering of light by spherical aerosols with the objective to obtain basic information useful for practical applications. Numerical data for Mie scattering have been analyzed to find general trends, to simplify interpolation problems, and to establish simple relationships between important parameters. Results of the research are given in the form of abstracts of 10 scientific reports and 6 related

papers. Revisions and additions to each report are given. An extensive bibliography of tables concerning Mie scattering and an atlas of scattering diagrams for six refractive indices from n = 1.1 to 1.5 and e alpha = 0.5 (0.5) 10 are given as appendixes. (Author)

AD-414 547 Div. 6, 25
(TISTM/TLG) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
ANALYSIS OF A DOUBLE-PARABOLOIDAL MIRROR SYSTEM,
by Denis M. Coffey. June 63, 21p.
AFCRL 63 128 Unclassified report

Descriptors: (*Optical equipment components, Design), (*Mirrors, Optical properties), (*Range finding, Optical equipment), (*Detectors, Optical equipment), Optical images, Measurement, Parabolic bodies.

An analysis of a double-paraboloidal mirror system, known as the clam shell device, is presented. It is evident from laboratory observations that the system produces real images which can be measured in both direction and distance. (Author)

AD-414 590 Div. 6, 8
(TISTE/JBM) OTS price $3.60

Microwave Associates Inc., Burlington, Mass.
LONG LIFE K-BAND DUPLEXER.
Quarterly technical rept. no. 3, 1 Dec 62-1 Apr 63,
by R. Brunton. 7 May 63, 13p.
Contract DA36 039SC90834, Proj. ARDS A 142
Unclassified report

Descriptors: (*Radar duplexers, K band), Transient-receive tubes, Semiconductor devices, Limiters, Models (Simulation), Ferrites, Electronic switches, Experimental data, Diodes (Semiconductor), Waveguides, Electric potential.

Research was continued on the development of a long life K-band three part duplexer. Technical activities on the long life gas TR tube, semiconductor switch limiter and ferrite limiter resulted in experimental models and test data. The gas TR tube was measured at an incident power of 3.6 KW without keep alive, the spike energy was 2. ergs and the flat power 75 milliwatts. The semiconductor switch limiter efforts were successful when a PIN diode was used in the ridged waveguide test fixture. With DC bias a switch was operated from 22 to 24.5 GC with an insertion loss of 1.4 db maximum and an isolation of 28.4 db minimum, the power level was 1 milliwatt. The same device was measured in the forward bias state (high isolation) at 1.KW incident power where the isolation was measured to be 30 db or greater. A ferrite limiter was measured with limiting in excess of 16 db. The insertion loss was 4 to 6. db. Preliminary multipactor units were constructed to to test surface and multipacting, however, test data has not been obtained. (Author)

AD-414 912 Div. 6, 8, 9, 12
(TISTW/AW) OTS price $4.60

Brown Engineering Co., Huntsville, Ala.
PARAMETERS INFLUENCING RADAR RETURNS FROM REENTRY VEHICLE WAKES,
by Harry C. Crews, Jr. 31 May 62, Technical note R1
Contract DA01ORD1019
Unclassified report

Descriptors: (*Wave transmission, Magnetohydrodynamics), (*Radar echo areas, Wakes), Reentry vehicles, Equations, Electromagnetic waves, Ionization, Polarization, Electron density, Blunt bodies, Hypersonic flow, Mathematical models, Radar reflections, Plasma sheathe, Gas ionization, Atmosphere entry, Mathematical analysis.

Using Maxwell's equations, the equations which describe electromagnetic wave propagation in a weakly ionized plasma are derived considering collisions. These equations are expressed in both electrical (permittivity and conductivity) and optical (index of refraction) terms. The dependence of plasma propagation properties on the flow chemistry and aerodynamics is described and a method of relating flow properties to propagation properties is outlined. (Author)

AD-414 965 Div. 6
(TISTP/WH) OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
INITIATION OF DEFLAGRATION WAVES AT SURFACES OF AMMONIUM PERCHLORATE-COPPER CHROMITE-CARBON PELLETS,
by Marjorie W. Evans, Rodney B. Beyer and Leonard McCulley. 19 Aug 63, 28p.
Unclassified report

Descriptors: (*Deflagration, Wave transmission), (*Wave transmission, Deflagration), Combustion, Ammonium compounds, Perchlorates, Copper compounds, Chromium compounds, Carbon, Pellets, Nitrogen.

The relationship between energy flux density I and exposure time tau, which defines the family of boundary conditions necessary and sufficient to cause initiation, was measured. Theoretical analysis was made by means of the partial differential equation which describes the space-time temperature distribution in the pellet in terms of chemical reaction rate, heat of reaction, thermal conductivity, heat capacity, optical absorptivity, and surface reflectivity. Integration of the equation using the experimentally determined chemical and physical parameters and boundary conditions gave the temperature of the pellet -- and in particular the temperature of the pellet surface -- as a function of time, with flux as a parameter. From this solution one obtained for given flux density (a) the temperature T(0,tau) of the initiating surface at the moment tau of cut-off of the energy pulse, and (b) a lower bound for the minimum thermal ignition time. (Author)

AD-415 088 Div. 6
(TISTW/JEA) OTS price $11.50

RCA Service Co., Inc., Patrick Air Force Base, Fla.
SOME FUNDAMENTALS OF INFRARED TECHNOLOGY AND INFRARED DATA REDUCTION ON THE ATLANTIC MISSILE RANGE,
by Eugene S. Smith. May 63, 1v. Mathematical services no. TR77
Contract AF08 606 5300
MTC TDR63 6 Unclassified report

Descriptors: (*Guided missile tracking system, Infrared tracking), (*Infrared tracking, Data processing systems), (*Data processing systems, Instruction manual), Infrared radiation, Guided missile ranges, Training, Telemetering data, Instrumentation, Infrared detectors, Programming (Computers), Measurement, Radiometers, Infrared optical systems, Intensity, Infrared equipment.

A survey of fundamental infrared technology centered around the AMR Infrared Measurements Program is presented with primary emphasis on basic radiometric concepts and the reduction of raw infrared data to radiometric quantities. The primary purpose is to provide a training aid and reference for data reduction personnel engaged in and/or training for the reduction of infrared data. Accordingly, basic principles are stressed beginning with a review of fundamental physical quantities and units. Since the AMR Infrared Measurements Program Instrumentation Systems have not reached operational status, their descriptions, which are based on reports published in 1961, are not definitive and the reductions are presented as methods which are subject to change. (Author)

AD-415 207 Div. 6
(TISTP/JEA) OTS price $18.50

Aeronutronic, Newport Beach, Calif.
TRANSMITTANCE TABLES FOR SLANT PATHS IN THE STRATOSPHERE.
Final rept., Vol. 5,
by Gilbert N. Plass. 22 May 63, 1v.
Contract AF04 695 96, Proj. 4479 730F, Task 447904
SSD TDR62 127, vol. 5 Unclassified report

Report on Infrared Transmission Studies.

Descriptors: (*Infrared radiation, Wave transmission), (*Wave transmission, Atmosphere), Water vapor, Carbon dioxide, Stratosphere, Tables, Atmosphere models, Absorption, Statistical data.

Tables are given for the transmittance over slant paths from initial altitudes of 15, 25, 30, and 50 km to the outer limit of the atmosphere. Values are given for all angles from vertical to horizontal in 5 degree steps. Results are presented for CO2 from 500 to 10,000/cm and for H20 from 1000 to 10,000/cm for both a dry stratosphere (uniform mixing ratio) and a wet stratosphere (mixing ratio increasing with height). The calculations are based on previously published transmittance tables for homogeneous paths and theoretical expressions for obtaining slant path transmittances from such results. (Author)

AD-415 430 Div. 6
(TISTW/JEA) OTS price $4.60

Mitre Corp., Bedford, Mass.
RADAR SYSTEMS AND TECHNIQUES DEPARTMENT ADVANCED DEVELOPMENT SUBDEPARTMENT.
Quarterly progress rept., 1 Jan-31 Mar 63.
Aug 63, 37p. Rept. no. PM22 24
Contract AF19 628 2390, Proj. 750
ESD TDR63 298 Unclassified report

Descriptors: (*Radar equipment, Operation), (*Correlation techniques, Radar equipment), (*Test equipment (Electronic), Radar equipment), Compatibility, Radar antennas, Radar transmitters, Radar receivers, Phase measurement, Correlators, Microwave oscillators, Servomechanisms, Radar range calibrators, Delay lines, Theory.

The progress of the advanced development subdepartment from January 1, 1963 to March 31, 1963 is presented. The work of the subdepartment currently centers about the design and fabrication of an experimental test-bed facility which will be used to test and evaluate the applicability of certain radar techniques and components to high-power, long-range radar problems. Complementary activities include development work leading to improved radar components. (Author)

7. ELECTRICAL EQUIPMENT

AD-414 234 Div. 7
(TISTE/JWS) OTS price $1.60

Boeing Co., Seattle, Wash.
QUALIFICATION TEST REPORT FOR MODEL SPECIFICATION S-133-111-1-39, AND QUALIFICATION SUPPLEMENT I THEREOF. ARRESTER SET, ELECTRICAL SURGE, LAUNCH FACILITY,
by R. P. Carlton. 27 Feb 63, 6p. Rept. no. D2 13289 2
Contract AF04 647 289
Unclassified report

Descriptors: (*Lightning arresters, Tests), Specifications, Launching sites.

AD-414 416 Div. 7, 8
(TISTM/ODN) OTS price $9.60

Stanford Research Inst., Menlo Park, Calif.
SUPPRESSION OF SPURIOUS FREQUENCIES.
Final rept., 25 Mar 62-15 May 63,
by L. Young, E. G. Cristal, B. M. Schiffman and L. A. Robinson. Aug 63, 106p.
Contract AF30 602 2734, SRI Proj. 4096
RADC TDR63 302 Unclassified report

Descriptors: (*Power equipment, Emissivity), (*Filters (Electromagnetic wave), Absorption), Coaxial filters, Electric filters, Attenuation, Low-pass filters, Frequency, Bolometers, Reports, Bibliographies, Band-pass filters.

The research described in this report covers several aspects of the fight to suppress the emission of spurious energy from high-power transmitters: waffle-iron filters to provide high reactive attenuation; harmonic pads to protect the transmitter and prevent arcing from harmonic resonances; leaky-wave filters to provide high dissipative attenuation; band-stop filters to provide high attenuation at particular frequencies; and wide-band bolometers to measure the combined power of many harmonic frequencies. The analytical investigation included the effect of filter bandwidth and filter type on the attenuation and group delay, and on the transient response to both rectangular and shaped pulses. (Author)

AD-414 502 Div. 7, 25
(TISTE/SBM) OTS price $3.60

Atomics International, Canoga Park, Calif.
UNIFORM WORK FUNCTION CATHODE STUDIES FOR THERMIONIC CONVERTERS.
Quarterly progress rept. no. 4, 12 Apr-12 June 63,
by M. N. Huberman. July 63, 31p. AI8829
Contract AF33 657 8726
Unclassified report

Descriptors: (*Cathodes, Thermionic converters), (*Thermionic converters, Cathodes), Work functions, Electron microscopes, Vapor plating, Processing, Molybdenum, Thermionic emission, Electron bombardment, Single crystals.

Efforts were continued on a study program to improve the efficiency of thermionic converters which have nonplanar geometries. Specifically, the investigation concerns the production of nonplanar cathodes having more uniform work functions and surface characteristics than are obtained with standard cathode fabrication techniques. A thermionic emission electron microscope for observing work function uniformity was constructed. Arc cast, single crystal, and vapor deposited molybdenum cathodes were examined with the microscope. Active spots due to electropolishing were observed on the (110) face of the single crystal. A vapor deposited cathode was found to have areas of uniform work function. A brief summary is given of the over-all course of the first year of the program and its most significant achievements. (Author)

AD-414 505 Div. 7, 25
(TISTE/JBM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EFFECT OF A MAGNETIC FIELD ON PHENOMENA IN A DIODE WITH GESIUM VAPORS,
by N. D. Morgulis and Yu. I. Chutov. 19 June 63, 16p.
FTD TT63 351/1+2 Unclassified report

Trans from Ukrainian periodical, Ukrains'kiy Fizi hniy Zhurnal, 7:9, pp. 1003-1012, 1962.

Descriptors: (*Thermionic converters, Magnetic fields), (*Magnetic fields, Thermeonic converters), Thermoelectricity, Diodes, Cessium, Vapors, Electron beams, Electrodes, Electric fields.

The effect of a magnetic field on an electron short circuit stream and on the characteristics of the entire stream was investigated in a decelerating electric field in a diode with cesium vapors as a close model of a thermoelectron energy transformer; and interpretation is given on the obtained expreimental results. (Author)

AD-414 577 Div. 7
(TISTM/BRW) OTS price $9.60

Delco-Remy Div., General Motors Corp., Anderson, Ind.
APPLIED RESEARCH INVESTIGATION OF SEALED SILVER-ZINC BATTERIES.
Quarterly technical progress rept. no. 1, 1 May-1 Aug 63,
by J. J. Lander, J. A. Keralla, L. M. Cooke, Paul Scardaville, and T. J. Wetherell. 2 Aug 63, 1v.
Contract AF33 657 10643, Proj. 8173, Task 817304 21
Unclassified report

Descriptors: (*Alkaline cells, Design), (*Storage batteries, Materials), Zinc, Silver compounds, Oxides, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Battery separators, Potassium compounds, Lithium compounds, Sodium compounds, Hydroxides.

Cycle life data on cells containing varying ratios of ZnO to silver indicate that increasing the ratio of ZnO to silver tends to increase cycle life. Separator overhang life tests are continuing after 500 cycles without failure. Electrolyte quantity tests at this time are not conclusive in determining maximum cycle life. Additional work is to be done in this area. Cells containing Dynel wrapped negatives do not show consistent cycle life, and on this test, do not deliver as many cycles as the control cells. Additional samples of Dynel will be utilized in new test cells. (Author)

AD-414 696 Div. 7
(TISTM/TCG) OTS price $1.60

New York State Coll. of Ceramics, Alfred U.
HYDROGEN-OXYGEN ELECTRODE STUDY.
Quarterly technical progress rept. no. 6,
by T. J. Gray, W. A. Bridgeo and R. B. Rozelle.
15 June 63, 11p.
Contract AF33 657 7564

Unclassified report

Descriptors: (*Fuel cells, Electrodes). (*Hydrogen, Electrodes). (*Oxygen, Electrodes). (*Electrodes, Fuel cells). Nickel, Asbestos, Potassium compounds, Hydroxides, Surface area, Polarization, Electrolytes, Electrolysis, Gels, Impregnation.

Porous nickel (Clevite Corporation no. 3 Porous Nickel) electrolyte fuel cells were operated with an asbestos electrolyte holder impregnated with both free 30% KOH and gelled 15% and 20% KOH. Indications were that gelled KOH had less mobility than the free electrolyte and would not wet or drown electrodes as quickly as free electrolyte unless mechanical pressure was applied to force the gel into an electrode. Better contact was obtained between the electrode and the electrolyte holder when KOH gel was used. Higher current densities and less polarization were experienced at 60-70 C than at room temperature. A gel of 20% KOH produced better results than one of 15% KOH. High open circuit potentials were obtained with gelled electrolyte. The major problems were dehydration of the KOH saturated electrolyte holder and the inability of the cell to support heavy loads. (Author)

AD-414 800 Div. 7, 4
(TISTM/ODN) OTS price $2.50

TYCO, Inc., Waltham, Mass.
RESEARCH RELATING TO FUEL CELLS. THE OXYGEN REACTION ON PLATINUM AND GOLD IN ACID SOLUTIONS.
Final and summary rept., 1 Oct 61-28 Feb 63,
by A. K. M. Shamsul Huq. 1 Apr 63, 1v.
Contract DA49 186ORD982

Unclassified report

Descriptors: (*Electrodes, Chemical reactions), (*Gold, Electrodes), (*Platinum, Electrodes), (*Oxygen, Chemical reactions), Fuel cells, Electrochemistry, Reaction kinetics, Sulfuric acid, Perchloric acid, Solutions, Electrolytes, Hydrogen peroxide, Reduction (Chemistry), Polarization, Electrolytic cells, Electric potential.

The electrode kinetics of the oxygen reaction were studied on smooth platinum and gold electrodes in acid solutions (H_2SO_4 and $HClO_4$) and at room temperature. Polarization curves were obtained both galvanostatically and at controlled potentials. The electrode coverage by absorbed oxygen and the extent of oxide formation were determined using chronopotentiometry and potentiostatic sweep methods. The kinetics of the electrochemical reduction and oxidation of hydrogen peroxide, an intermediate found in solution during the reduction of oxygen, were also studied. Platinum forms a thin oxide at potentials where oxygen evolution takes place. The rate-determining reaction in oxygen evolution is the discharge of a water molecule which occurs with a Tafel slope of 0.086 V. On cathodized (reduced) Pt surfaces, the discharge of water occurs at a higher rate than on superficially oxidized surfaces. The transfer coefficient on cathodized surfaces corresponds to a nearly symmetrical energy barrier. (Author)

AD-414 917 Div. 7
(TISTM/REB) OTS price $2.60

International Resistance Co., Philadelphia, Pa.
RESISTORS, FIXED FILM TYPE GENERAL PURPOSE.
Quarterly progress rept. no. 16, Apr-June 63,
by Jerome G. Burns. June 63, 29p.
Contract DA36 039sc81283

Unclassified report

Descriptors: (*Fixed resistors, Reliability), Films, Tests, Manufacturing methods, Failure (Mechanics), Reliability (Electronics), Moisture, Impregnation, Polarization.

Pilot run testing of the RC-20 ranges is approximately 90% complete. Three ranges (100K , .27 megohm and .5 megohm) have developed failures during 100 C load life and 150 C no-load testing. A study has been undertaken to determine whether 100 C load life and 150 C no-load performance can be improved by impregnating the molded jacket of the resistor with Aroclor, a chlorinated polyphenyl. The results after 500 hrs testing show that 100 C load life performance is significantly improved. However, the treatment had no effect on 150 C no-load performance. Three moisture polarization failures of critical range units (.27 megohm) are attributed to damage caused by the test fixture. all seven RC-07 ranges have been manufactured, inspected and have begun Pilot Plant testing. (Author)

AD-415 024 Div. 7
(TISTM/AMS) OTS price $2.60

Westinghouse Electric Corp., Lima, Ohio.
SOLAR THERMOELECTRIC GENERATOR SYSTEM CONCEPT AND FEASIBILITY STUDY.
Quarterly rept. no. 6, 15 May-15 Aug 63,
by J. L. McCabria and D. A. Naumer. 15 Aug 63, 23p.
Contract AF33 657 8089, Proj. 8173, Task 817302 10

Unclassified report

Descriptors: (*Generators, Solar radiation), (*Solar radiation, Generators), (*Thermoelectricity, Solar radiation), Design, Feasibility study, Tests, Life expectancy, Experimental data, Gamma rays, Electric power production, Lithium compounds, Hydrides, Models (Simulators).

Ground level - natural sunlight testing of the solar powered thermoelectric generator has been completed. Evaluation of the test data has shown that the short within the generator, which occurred during simulated altitude evaluation, has been repaired. Maximum power output obtained during solar testing was 20 watts. The waste heat radiator was operated at a lower temperature than would be encountered in a space atmosphere. The rate of heat input to the thermopile was therefore greater than that to be expected under space flight conditions. This shortened the cycle from 90 to 83.3 minutes. The integrated average for an 83.3 minute cycle is 17.82 watts or 24.8 watt hours output. The overall efficiency for the cycle is 3.55% including convection losses. Assuming the collector concentrator efficiency to be 86.6% the generator efficiency including reradiation but excluding convection losses from the vacity is 4.53%. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-414 105 Div. 8, 2
(TISTP/FEM) OTS price $8.10

Upper Air Research Labs., U. of Utah, Salt Lake City.
AN UPWARD PULSE DELAY SYSTEM FOR MEASURING ELECTRON DENSITIES OF THE IONOSPHERE.
Final rept.,
comp. by Robert E. Watson. 1961, 81p. Scientific rept. no. 5
Contract AF19 604 2227
AFCRL 1022 Unclassified report

Descriptors: (*Ionosphere, Electron density), (*Atmospheric sounding, Radio transmission), (*Ionospheric propagation, Electronic equipment), Rockets, Reentry vehicles, Measurement, Pulse modulation, Radio transmitters, High frequency, Transistor amplifiers, Radio receivers, Gates (Circuits), Automatic gain control, Signal-to-noise ratio, Bandwidth, Sensitivity, Amplifiers, Recording systems, Rocket antennas.

A system is described which measures the free electron content of the Ionosphere by the transmission of rf pulses between a rocket, which is passing through the Ionosphere, and the ground. The basic requirements and operation of the system as a whole are examined. The development and design of each of the component parts of the system are then discussed, including circuit diagrams and any important construction details. Special emphasis is placed on the design of a ground based low frequency pulsed transmitter. The design of a low frequency rocket-borne receiver also capable of operation from 4 to 12 mc is discussed in detail. The receiver is completely transistorized and incorporates a unique gated AGC system which greatly improves the signal to noise ratio in the receiver output. A ground station for receiving and recording the pulses transmitted from the rocket is also described including the circuit design of the various units. (Author)

AD-414 155 Div. 8
(TISTP/FEM) OTS price $9.10

Digital Computer Lab. U. of Illinois, Urbana.
CYCLIC SPOT-ERROR-CORRECTING CODES,
by Clinton R. Foulk. 22 July 63, 106p. Rept. 141
Contract Nonr1834 27
Unclassified report

Descriptors: (*Communication theory, Coding), (*Data transmission systems, Errors), Radio transmission, Radio receivers, Matrix algegras, Detectors, Intelligibility, Data storage systems, Distortion.

The problem of transmitting and storing large amounts of information with high reliability has recently come under investigation. Several methods of adding redundant information to a message have been suggested. The method which we shall investigate is an outgrowth of the parity check. A parity check bit is a single zero or one bit of information added to a binary message so as to make the number of one's in the entire message be of odd or even parity, whichever has been agreed upon. Then, if an odd number of errors occurs in the transmission of a message, this fact is immediately detected by the receiver because the number of ones is of the wrong parity. (Author)

AD-414 158 Div. 8
(TISTM/REB) OTS price $4.60

Victor Comptometer Corp., Chicago, Ill.
ULTRAMINIATURE QUARTZ CRYSTAL UNITS.
Final rept. 15 June 60-14 Oct 62,
by Len A. Tyler. 14 Oct 62, 46p. Rept. no. 9
Contract DA36 039sc85348, DA Proj. 3A99 15 001 02
Unclassified report

Descriptors: (*Quartz resonators, Subminiature electronic equipment), (*Subminiature electronic equipment, Quartz resonators), Manufacturing methods, Crystals.

Ultraminiature quartz resonators meeting the minimum Q requirement of 10,000 were fabricated at frequencies from below 9 mc to above 150 mc. Quartz plates as small as .100 inch in diameter gave satisfactory results over most of this frequency range. Contouring was necessary below 25 mc, but plane-parallel plates proved satisfactory above this frequency. Both ceramic and glass enclosures were developed for these resonators. The overall volume of these enclosures was less than .002 cubic inches. Metal holders obtained from a commercial source were also used. These holders had a volume of approximately .006 cubic inches. (Author)

AD-414 347 Div. 8
(TISTP/FEM) OTS price $4.60

Electrical Engineering Research Lab., U. of Texas, Austin.
ANTENNA AND RADIO WAVE PROPAGATION CHARACTERISTICS AT VHF NEAR AND IN THE GROUND,
by D. M. Schwartz and A. H. LaGrone. 30 June 63, 43p. Rept. no. 6 55
Contract AF19 604 8038, Proj. 4603.
AFCRL 63 684 Unclassified report

Descriptors: (*Antenna radiation patterns, Earth), (*Earth, Electrical properties), (*Antenna lobes, Attenuation), Signals, Polarization, Radiation, Dipole antennas, Very high frequency, Theory, Measurement, Antennas, Intensity, Electrical impedance, Standing wave ratios, Dielectrics, Soils, Propagation, Electromagnetic waves, Radio waves, Reflection.

The effects of a finitely conducting earth on the field attenuation and on the radiation impedance and radiation pattern of a half wave dipole antenna in and near the earth are investigated and reported. The measurements were made at two frequencies, f = 93.7 Mc/s and 179.5 Mc/s. The signals were horizontally polarized and measurements were made for antenna heights varying in 0.1 wavelength increments from one wavelength above ground to about 0.3 wavelength below ground. Excellent agreement between theory and measurements was found in all but one case. (Author)

AD-414 351 Div. 8
(TISTE/JWS) OTS price $3.60

Microwave Associates, Inc., Burlington, Mass.
HIGH POWER TRANSMISSION LINE AND ASSOCIATED MICROWAVE PARTS.
Final rept., 1 July 61-31 May 63,
by Meyer Gilden. 31 May 63, 16p.
Contract NObsr 85455
Unclassified report

Descriptors: (*Waveguides, S band), Radiofreuency power, Measurement, Waveguide couplers, Waveguide bends, Waveguide windows,

Cooling, Waveguide switches, Metal seals, Coolants, Water, Standing wave ratios.

A high power S-band transmission line was designed, constructed and evaluated for operation at 45 kilowatts of average power and 15 megawatts of peak power. The components included straight sections, bends, directional couplers, a window and a gas discharge duplexer. Pressurization and cooling fins were required to meet the power requirements. For super-power transmission lines, it is recommended that the low loss mode in circular waveguide, TE01, be used. (Author)

AD-414 361 Div. 8
(TISTP/FR) OTS price $7.60

Electrical Engineering Research Lab., U. of Texas, Austin.
A SPECTROSCOPIC MEASUREMENT OF THE RESONANT ABSORPTION OF MICROWAVE ENERGY BY OXYGEN IN THE 2.5-MILLIMETER WAVELENGTH REGION.
Quarterly engineering rept. no. 5,
by A. E. Schulze. 1963, 72p.
Contract AF33 657 8716, Proj. 4062
Unclassified report

Descriptors: (*Microwave spectroscopy, Spectrum analyzers), Microwaves, Wave transmission, Absorption, Attenuation, Atmosphere, Oxygen, Water vapor.

A microwave spectrometer was used to measure the dependence of the oxygen component of absorption in the vicinity of 118.75 Gc. The variations of line shape, both width and intensity, for a wide range of atmospheric pressures are described by the reported measurements. For 100% oxygen at a temperature of 300 K, the measurements associated with the best fit of the Van Vleck-Weisskopf shape, yield a line-width parameter of delta nu over P equals 2.08 Mc/mm Hg for P is equal to or lesser than 4 mm Hg and delta nu over P equals 1.90 Mc/mm Hg for 4 mm Hg for P is equal to or lesser than 760 mm Hg, and a peak intensity which increases very slightly with pressure from 6.5 db/km at 3.5 mm Hg to 7.0 db/km at 500 to 760 mm Hg. (Author)

AD-414 362 Div. 8
(TISTE/JWS) OTS price $3.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
SOLID-STATE CIRCUITS.
Quarterly progress rept. no. 4,
by S. Hamilton, W. W. Heinz, S. Okwit and E. W. Sard. Apr 63, 33p. Rept. no. 1654 I 4
Contract AF30 602 2699
RADC TDR63 283 Unclassified report

Descriptors: (*Waveguide circulators, C band), (*Transmission lines, Impedance matching), (*Parametric amplifiers, C band), Equations, Standing wave ratios, Gain, Dielectrics, Bandwidth, Bandpass filters, Tuned amplifiers, Phase measurement, Broadband, Noise (Radio).

Calculations of the expected performance of the unmatched Bendix circulator, as predicted by Bosma's analysis, were completed. Experimental data was obtained using the proper center conductor that agreed qualitatively with the theory. The qualitative study of idealized input impedance of a parametric amplifier, performed during the early phases of this program, was used to double-tune the balanced C-band parametric amplifier so that the phase shift would be a linear function of frequency. This technique was very successful, providing a 500-Mc instantaneous bandwidth with a gain of about 10 db, a noise figure of 3.55 db, and a relatively flat phase characteristic. The amplifier has been packaged in a standard 19 by 24 inch rack mount, and is completely self-contained. (Author)

AD-414 370 Div. 8
(TISTP/FEM) OTS price $8.10

New York U. Coll. of Engineering, N. Y.
RELIABILITY IMPROVEMENT OF DIGITAL COMMUNICATION USING REDUNDANCY IN UNCERTAINTY REGION RECEPTION.
Scientific rept. no. 13
by Ludwik Kurz. June 63, 78p. TR no. 400 77
Contract AF19 604 6168, Proj. P4610, Task T461003,
AFCRL Rept. no. 63 187
Unclassified report

Descriptors: (*Communication theory, Reliability), (*Data transmission systems, Redundant components, (*Digital systems, Communication systems), Errors, Coding, Noise, Intelligibility, Signals, Detection, Signal-to-noise ratio, Probability, Filters (Electromagnetic wave), Correlation techniques, Bandwidth, Equations.

An efficient method is considered for utilizing the redundancy of the transmittible language to improve the reliability of a digital communication system disturbed by additive non-white gaussian noise. Namely, the reliability of digital systems using orthogonal and binary digit codes is improved by introducing an uncertainty region at the receiver. This method is an extension and generalization of null-zone reception previously applied to the improvement of binary transmission in the presence of white gaussian or peak-limited noise. It is shown that, by permitting a small percentage of nulls to be printed, considerable improvement in reliability is achieved. In addition, it is shown that communication links using orthogonal digit coding afford greater reliability than corresponding links using binary digit coding. Performance results are given for several different codes for the case in which the demodulated gaussian noise power density spectrum increases with increasing frequency. Such a noise power density spectrum acts as a weighting function which confines the generated signals to the available band of frequencies. A geometric interpretation of the results is given in terms of n-dimensional Euclidean space. (Author)

AD-414 410 Div. 8
(TISTP/FR) OTS price $4.60

Electrical Engineering Research Lab., U. of Texas, Austin.
ATMOSPHERIC ABSORPTION OF ELECTROMAGNETIC RADIATION IN THE FREQUENCY REGION 120 TO 132 KMC/S. PART II.
Quarterly engineering rept. no. 5,
by C. O. Hemmi. 1963, 40p.
Contract AF33 657 8716, Proj. 4062
Unclassified report

Descriptors: (*Microwaves, Attenuation), Radio waves, Extremely high frequency, Attenuation, Absorption, Atmosphere, Oxygen, Water vapor.

The measurements and interpretation of the absorption of electromagentic radiation by the earth's atmosphere at frequencies of 120, 125, and 132 kMc/s are described in this report. Data was taken at 5 pressures corresponding to pressure altitudes in the earth's atmosphere between 8 and 0.25 km. These measurements indicate the presence of a water vapor absorption

line near 121 kMc/s with a peak intensity of 0.107 db/km gm/m to the 3rd power. The anomalous values of water vapor absorption observed by previous investigators may, therefore, be due to other unpredicted water vapor lines. Measurement techniques are described and previous measurements of water vapor attenuation are summarized. (Author)

AD-414 486 Div. 8, 25
(TISTM/AM) OTS price $2.50

General Electric Co., Syracuse, N. Y.
STUDY OF ELECTRON FOCUSING BY NON-LINEAR SPIRALS.
Final rept., Feb 62-Mar 63.
May 63, 98p.
Contract AF33 657 7682, Proj. 4156, Task 415605
ASD TDR63 461 Unclassified report

Report on Electronic Tube Technology.

Descriptors: (*Electron lenses, Focusing) (*Electron optics, Electron lenses), Image intensifiers (Electronics), Image tubes, Lenses, Performance (Engineering), Reflection, Design, Tables, Equations, Surface properties, Optical coatings, Measurements, Resistance (Electrical), Electrostatics, Parabolic bodies, Anodes, Cathodes.

The purpose of the research work was to develop an electrostatic image converter with the following capabilities: (1) Electrostatic image formation between two plane surfaces, (2) Control of electronic magnification by spiral-lens elements, (3) Development of reflective electron-optics for image formation from photoconductive targets. Early experiments used a thermionic analog. This consisted of a perforated 3 in. metal plate, which was illuminated by a collimated floodbeam at controlled voltage. The built-in field-lens problem was attacked first by a ray-tracing analysis. This suggested the use of a convex mesh, close to cathode. Although image quality was disappointing, the tests verified the need for a convex, rather than a concave, shape of the mesh. Next, the functions of first-anode and field-flattening were separated. This led to a two-mesh field-lens of the plano-convex type. This structure was retained for the remainder of the contract. As an alternative, the balancing of abberations in a lens doublet was investigated and was found to be operational. (Author)

AD-414 495 Div. 8
(TISTE/JBM) OTS price $3.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
RESEARCH AND DEVELOPMENT ON HIGH-POWER CRESTATRONS FOR THE 100-300 MC FREQUENCY RANGE.
Quarterly progress rept. no. 12, 1 Apr-1 July 63,
by G. T. Konrad. July 63, 25p.
Contract NObsr81403, Proj. SF0100 201, Task 9294
Unclassified report

Descriptors: (*Electron tubes, Power amplifiers), (*Power amplifiers, Electron tubes), Ultrahigh frequency, Very high frequency, Electron beams, Electron guns, Programming (Computers), Digital computers, Power, Bandwidth, Focusing, Magnets, Microwave amplifiers, Solenoids, Electrostatic fields, Experimental data, Physical properties, Electrical properties, Electric currents.

Research was continued on a development program on high-power 100-300 mc Crestatrons. The aim is to construct compact 100-watt Crestatrons employing permanent magnet focusing. Initially the tubes will be tested in a solenoid until they meet electrical specifications. Ultimately the permanent magnet focused tubes employing a depressed potential collector will be ruggedized so as to meet environmental specifications. Theoretical as well as experimental studies on high-perveance hollow-beam electron guns, in addition to electrostatic focusing systems were continued. The P Mu = 20 hollow gun was programmed for solution on a digital computer. The electron trajectory plots obtained are described. The necessary steps to be taken in order to improve the gun performance are listed. A number of 100-watt Crestatrons were tested. Even though the saturation power output is still somewhat low, it is shown that the bandwidth as well as the conversion efficiency are satisfactory. The results of tapering the phase velocity of the slow-wave structure are described. A suggestion is made on how to take advantage of phase focusing near the tube output more fully. (Author)

AD-414 512 Div. 8
(TISTP/FEM) OTS price $11.50

David Sarnoff Research Center, Princeton, N. J.
THEORY OF ADJUSTABLE SWITCHING NETWORKS,
by S. Amarel, S. Y. Levy, C. V. Srinivasan and R. O. Winder. 30 Apr 63, 1v. SSR2
Contract AF19 604 8423, Proj. 4641, Task 464101
AFCRL 63 185 Unclassified report

Descriptors: (*Switching circuits, Theory), (*Electrical networks, Gates (Circuits)), (*Reliability, Switching networks), Computer logic, Synthesis, Linear programming, Mathematical logic, Artificial intelligence, Probability, Bionics, Rudundant components, Networks.

Part 1 (Threshold Logic) consists of a comprehensive survey of threshold logic, a geometric result relevant to estimating the number of threshold functions, generalizations and strengthening of known bounds on the logical capabilities of threshold gate networks, computer-aided work on the realization of arbitrary functions by networks of three-input majority gates (including a list of realizations for every type of four-argument switching function), and a comparison of two methods for synthesis of very large threshold gates: the well-known Bayesian approach and a geometric alternative. The latter method is shown to be preferable. Part 2 (Reliability of Switching Networks) presents a survey of several important schemes for introducing redundancy into a combinational network for the improvement of reliability. Some extensions of the previous analyses of recursive triangles and initial results on the incorporation of memory and feedback to allow the use of fewer basic gates in a time-shared fashion. (Author)

AD-414 540 Div. 8
(TISTE/JWS) OTS price $3.60

Lansdale Div., Philco Corp., Pa.
PEM FOR TRANSISTOR MANUFACTURING PROCESS IMPROVEMENT.
Quarterly progress rept. no. 4, 1 Feb-30 Apr 63,
by J. Sanders. Apr 63, 1v.
Contract DA36 039SC86720, Proj. R 232 1
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Manufacturing methods, Transistors), Production, Life expectancy, Reliability (Electronics), Furnaces, Failure (Mechanics), Test equipment, Environmental tests.

Data is submitted on the operating and storage life tests and environmental tests performed on two groups of pilot line transistors. The failure rates demonstrated by the tests are higher than the specified goal. The test results are not consistent with evaluation of units of the same type fabricated in the factory, or of units manufactured earlier on the pilot line. Failed units are being analyzed to define the failure mechanisms. Installation of the hot sealing oven in a factory drybox is complete and units are being processed through it for accumulation of 2500 units for evaluation. The helium leak test equipment is in the process of being installed in the factory line area. While awaiting completion of the installation, units are being helium leak tested on existing laboratory equipment. The Reliability and Quality Control Department is sampling the production line output to qualify the device for general sale. Additional work is reported in connection with production line process control inspections. Further work on thermal resistance determination is described. The work centered on the d-c Beta method. Procedures of the method are described and its advantages and anticipated usefulness are indicated. Production line transistor failure rates continue to have a close fit with the proposed acceleration curve. (Author)

AD-414 554 Div. 8
(TISTE/JBM) OTS price $3.60

Traveling Wave Tube Product Section, General Electric, Co., Palo Alto, Calif.
APPLIED RESEARCH OF BEAM INTERACTION STRUCTURES FOR TRAVELING WAVE TUBES.
Final rept. Apr 62-Apr 63,
by C. E. Enderby. May 63, 28p.
Contract AF33 657 8360, Proj. 4156, Task 415603
ASD TDR63 569 Unclassified report

Descriptors: (*Traveling wave tubes, Electron tube parts), (*Microwave amplifiers, Traveling wave tubes), Waveguide couplers, Electron beams, Tests, Gain, Power, Extremely high frequency, Rings, Propagation, Circuits, Bandwidth, Electrical impedance, Electrical properties, Configuration, Electric fields, Electron guns.

Efforts concerneda program of applied research on a TWT interaction structure for high-power and high-frequency applications. The structure is of the ring-plane family, and consists of periodically spaced rings mounted on radial planes. The program consisted of two parts: an exhaustive study of the properties of this family of circuits, including such items as propagation characteristics, mode suppression, interaction impedance, bandwidths, field variation, and building a traveling-wave amplifier in the 35 Gc region using one of these circuits. The conclusions that can be reached from this program are that the ring plane circuits are very well suited to the high-frequency high-power region as both an oscillator and an amplifier. They can have high gains and high efficiencies with large peak power and average power capabilities. (Author)

AD-414 557 Div. 8
(TISTE/OHD) OTS price $2.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
FEASIBILITY INVESTIGATION OF DOUBLE-CONVERSION PARAMETRIC AMPLIFIER OPERATING FROM 1 TO 4 GC.
Quarterly rept. no. 2, 1 Jan-31 Mar 63.
Apr 63, 14p. AIL259512
Contract DA36 039SC AMC00063, Army Proj. 2Z44 02 001
Unclassified report

Descriptors: (*Parametric amplifiers, Feasibility studies), L band, S band, Gain, Broadband, Diodes (Semiconductor), Varactor diodes, Frequency converters, Theory, Bandwidth.

There are two approaches that can be used to build a parametric amplifier with 10-db gain and 2000-mc bandwidth; (1) the double-conversion parametric amplifier, and (2) a cascade of broadband one-port parametric amplifiers. The first approach requires a broad-band sum-frequency amplifier followed by a Ku-band one-port amplifier and a demodulator. With presently available varactor diodes, four cascaded Ku-band amplifiers are required to provide the required gain and bandwidth. The second approach only requires a cascade of four S-band parametric amplifiers. Also, because of the lower frequencies involved, only conventional diodes are required with the second approach, whereas very high quality diodes are required for the Ku-band amplifiers. We feel that the second approach therefore, will result in a much simpler, less expensive, and more reliable system. (Author)

AD-414 581 Div. 8
(TISTE/JBM) OTS price $2.60

Harry Diamond Labs., Washington, D. C.
A HIGH ISOLATION ABSORPTION MODULATOR-SWITCH FOR 1.2-CM WAVELENGTH,
by Frank Reggia. 8 July 63, 23p.
Proj. 26300
HDL TR1151 Unclassified report

Descriptors: (*Waveguide switches, Modulators), (*Modulators, K band), (*Electric switches, Modulators), Absorption, Amplitude modulation, Ferrites, Waveguides, Magnetic fields, Impedance matching, Microwave equipment, Time.

The design and operation is described of a K-band absorption modulator for high-speed switching or amplitude modulation of microwave power. This reciprocal ferrite modulator, designed in standard rectangular waveguide and making use of a longitudinal magnetic control field, has electrical characteristics particularly desirable in a microwave switch. These include a zero-field insertion loss of less than 1 db, a switching action (isolation) of greater than 75 db -- which is nearly independent of the magnetic control field in this state, and a matched input impedance for all values of applied field. These electrical characteristics are nearly constant over a 20-percent bandwidth. It is also possible to design this amplitude modulator for small phase shifts at the desired operating frequency. Other characteristics of the modulator include small size (3 in. max. length), magnetic control fields of less than 50 oersteds, operating temperature exceeding 100 C, and a switching-time capability of less than 0.1 microseconds. (Author)

AD-414 588 Div. 8
(TISTE/OHD) OTS price $3.60

Microwave Associates Inc., Burlington, Mass.
UHF DUPLEXERS SEMICONDUCTOR EFFORT.
Quarterly progress rept. no. 2, 5 Feb-5 May 63,
by Joseph White and Sumner Segal. 10 July 63, 20p.
Contract NObsr89105, Proj. SF0010205, Task 6185
Unclassified report

Descriptors: (*Radar duplexers, Ferrites), (*Limiters, Semiconductor devices), Diodes

(Semiconductor), Theory, Mathematical analysis, Transmission lines, Electrical properties, L band.

The design criteria for an optimum semiconductor receiver protector circuit are presented. Using these criteria the characteristics of a self-switching PIN diode limiter for use in the 420 mc range are derived. Measured data on a four diode switch are presented and compared with the program requirements. Two approaches to the 420 mc circulator design are described along with measurements of high power and low power performance. (Author)

AD-414 615 Div. 8, 30, 1
(TISTA/VGW) OTS price $10.10

Librascope Div., General Precision, Inc., Glendale, Calif.
L3020 DATA-PROCESSING SYSTEM RELIABILITY RUN RESULTS.
Final engineering rept.,
by W. H. Glaister and G. F. Swygard. 19 Nov 62, 1v. Rept. no. 2 0139
Contract FAA BRD289
Unclassified report

Descriptors: (*Civil aviation, Data processing systems), (*Data processing systems, Reliability electronics), Operations research, Digital computers, Digital systems, Maintenance, Effectiveness.

The successful 30 day L3020 Reliability Run proved the feasibility of continuous scheduled operations of a duplexed system. Mean-Time-to-Error for the total system was 17.05 hours, while Mean-Time-to-Interrupting-Failure was 34.09 hours. The test results indicated a Mean-Time-to-System-Recovery of 10.6 minutes. On-line failures during the test totaled three; two component failures and one solder joint failure. No major failures occurred during the test, nor were any major overhauls required. The 30 day test was a ''shakedown'' run as well as reliability test, and constituted a simulated operational trial of the system after preliminary acceptance by the FAA. The initial trial run also provided a personnel learning period with respect to equipment operation and preventive maintenance procedures and techniques. (Author)

AD-414 664 Div. 8
(TISTM/EJH) OTS price $2.60

Case Inst. of Tech., Cleveland, Ohio.
MATRIX DESCRIPTION OF WAVEGUIDE DISCONTINUITIES IN THE PRESENCE OF EVANESCENT MODES.
by Haim Haskal. July 63, 19p. Scientific rept. no. 2
Contract AF19 628 1699, Proj. 5635, Task 563502
AFCRL 63 311 Unclassified report

Descriptors: (*Waveguides, Theory), (*Microwave networks, Theory), Mathematical analysis, Integral equations, Scattering, Electromagnetic waves, Propagation.

The properties of the impedance and scattering matrix describing waveguide discontinuities are examined; both propagating and evanescent modes are considered. It is shown how different normalization conditions for the normal mode solutions in the guide affect the impedance matrix. A suitable choice of normalization always leads to a symmetric imaginary impedance matrix for a lossless structure. (Author)

AD-414 690 Div. 8, 25
(TISTP/WH) OTS price $3.60

Brown Engineering Co., Huntsville, Ala.
A NUMERICAL METHOD FOR COMPUTING TRANSMISSION AND REFLECTION COEFFICIENTS OF AN INHOMOGENEOUS PLASMA LAYER,
by J. M. Scarborough. June 63, 25p. Technical note R51
Contract DA01 0090RD1019
Unclassified report

Descriptors: (*Plasma physics, Wave transmission), (*Reentry vehicles, Telemetering systems), (*Plasma sheaths, Reentry vehicles), Electromagnetic wave reflections, Numerical methods and procedures.

A numerical method of computing reflection and transmission coefficients for inhomogeneous plasma layers when the gradient of inhomogeneity is normal to the surface of the layer is presented. The method is applied to a specific problem of telemetry from a body reentering the earth's atmosphere and the results are discussed. (Author)

AD-414 694 Div. 8, 5
(TISTP/HSS) OTS price $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADIO PHYSICS.
Quarterly progress rept., 1 Jan-31 Mar 63.
15 May 63, 15p.
Contract AF19 628 500
AFESD TDR63 97 Unclassified report

Descriptors: (*Atmosphere entry, Reentry vehicles), (*Communication systems, Space surveillance systems), (*Plasma physics, Experimental data), Radio signals, Mars, Space communication systems, Radar signals, Radio communication systems, Communication satellites (Active), Radio astronomy.

AD-414 789 Div. 8
(TISTE/CAM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PULSE MAGNETIC DECODER,
by I. V. Lebedev. 22 May 63, 4p.
FTD TT63 459 Unclassified report

Trans. from Russian Patent No. 145064, (Appl. No. 695956/26, 1 Feb 1961), pp. 1-3, 1962.

Descriptors: (*Magnetic cores, Coding), Computer logic, Pulse analyzers, Electric currents.

AD-414 794 Div. 8
(TISTE/PAR) OTS price $5.60

New Mexico U., Albuquerque.
EXPERIMENTAL VERIFICATION OF THE INPUT IMPEDANCE OF THE COAXIAL UNDERSEA ANTENNA,
by Vincent R. Chavez and William T. Cowan.
July 63, 49p.
Contract Nonr2798 01
Unclassified report

Descriptors: (*Antenna, Underwater), (*Coaxial cables, Underwater), Sea water, High frequency, Transmission line, Electrical impedance, Measurements, Test methods, Wave transmission, Radio transmission, Attenuation, Propagation, Electric fields, Very high frequency, Resistance (Electrical), Test equipment (Elec-

tronics), Antenna configurations, Underwater communication systems, Test facilities, Dielectric properties, Mathematical analysis.

An experiment was performed to check the expressions for the impedance of a coaxial type of antenna submerged in a conducting medium (sea water). The experiment was conducted at high frequencies in order to take advantage of frequency scaling. Details of the construction of the antenna along with methods and results of experimental measurements on the antenna are included. The experimental results check closely with the theoretical values obtained using expressions derived on the assumption that the antenna in a conducting medium is considered a transmission line with a lossy outer conductor. (Author)

AD-414 810 Div. 8
(TISTE/CAM) OTS price $5.60

Electronic Communications, Inc., Timonium, Md.
EXPERIMENTAL PROGRAM OF STEERABLE ANTENNA FOCUSING INVESTIGATION (STAFT). TWO-DIMENSIONAL SELF-FOCUSING ARRAY ANTENNA MODEL.
Aug 63, 45p.
Contract AF30 602 2930, Proj. 4506, Task 450604
RADC TDR63 270 Unclassified report

Descriptors: (*Antenna configuration, Focusing), (*Focusing, Automatic), Model tests, Antenna radiation patterns, Measurement, Test equipment (Electronics), Monitors, Antenna masts, Gain, Antenna components, Gust loads.

A description is presented of the experimental test program for determining the properties of the two-dimensional self-focusing array antenna model. The initial efforts of the program have been devoted to the design and construction of the test equipment to be used in the field probing operation. The results of these efforts are described. A brief discussion of the salient features of the self-focusing technique in a two-dimensional mode of operation is reviewed as background. Preliminary efforts have been made to provide more specific definitions and objectives of the tests to be performed. This is also discussed. (Author)

AD-414 850 Div. 8, 2
(TISTP/FR) OTS price $1.60

Naval Research Lab., Washington, D. C.
THE USE OF AN HF LUNAR REFLECTION CIRCUIT IN THE STUDY OF IONOSPHERIC ELECTRON DENSITY.
Interim rept.,
by J. R. Davis and F. H. Utley. 19 July 63, 12p.
NRL Rept. 5968 Unclassified report

Descriptors: (*Radio echo areas, Moon), Moon, Moon, Radar pulses, High frequency, Reflection, Wave transmission, Ionosphere, Attenuation, Measurement, Electron density.

A high-power hf transmitter was used to illuminate the moon at moonrise. The returned signals which have been observed display both the smooth-sphere scattering components and the rough-scatterer components reported previously by observers utilizing the vhf and uhf bands. It is believed that this study represents the first evidence of similar scattering phenomena observed at high frequencies. During most observation periods, the initial appearance of the moon-reflected signal was later than would be expected from considerations of antenna beam structure and ionospheric refraction alone. The received moon echoes were subjected to a high degree of predetection bandwidth narrowing and were analyzed to yield information regarding the possible extent of polarization-rotation undergone by radio waves traversing the ionosphere. (Author)

AD-414 870 Div. 8, 25, 16, 30
(TISTM/EJH) OTS price $21.00

Research Lab. of Electronics Mass. Inst. of Tech. Cambridge.
(No title).
Quarterly progress rept. no. 70,
by H. J. Zimmermann and G. G. Harvey. 15 July 63, 371p.
Contracts DA36 039sc78108 and AF19 604 5992
Task 3 99 25 001
Unclassified report

Descriptors: (*Physics, Scientific research), (*Electronics, Scientific research), (*Radio astronomy, Scientific research), (*Plasma physics, Scientific research), (*Communication systems, Scientific research), Microwave spectroscopy, Infrared spectroscopy, Nuclear magnetic resonance, Hyperfine structure, Mercury, Electron beams, Molecular beams, Acoustics, Electromagnetism, Magnetohydrodynamics, Machine travalation, Data processing systems, Language, Neurology, Bionics, Cesium, Atomic energy levels.

Quarterly report of M. I. T. Research Laboratory of Electronics for the three month period ending 31 May 63. Areas of research include: Radio physics. Plasma dynamics. Communication sciences and engineering.

AD-414 886 Div. 8
(TISTE/CAM) OTS price $10.10

Radio Corp. of America, Lancaster, Pa.
APPLIED RESEARCH ON HIGH RESOLUTION CAMERA TUBES,
by S. Grey, P. Herold, J. B. Lurie, P. C. Murray and O. J. Ziemelis. Aug 63, 115p.
Contract AF33 657 7939, Proj. 4156, Task 415605
ASD TDR63 633 Unclassified report

Descriptors: (*Camera tubes, Resolution), Electron guns, Measurement, Signal-to-noise ratios, Electron beams, Cathodes (Electron tubes), Surfaces properties, Programming (Computers), Test equipment (Electronics), Test methods, Particle accelerator Targets, Particle trajectories, Processing, Wiring diagrams, Life expectancy, Coatings.

Image orthicons with structured targets were tested using a new cycled test set which separates the functions of exposure and read-out by a selected time interval. Resolution of image orthicons, when cycled in a manner corresponding to slow scan read-out, has exceeded 50 percent sine-wave response at 500 TV lines/inch. Possible means of increasing resolution toward the contract objective of 1500 TV lines/inch are discussed. Electron gun resolution, measured at high velocity, was nearly doubled during the year. Improvement was achieved by smoothing the mixed carbonate cathode coating. The procedures used to process targets are explained in detail. (Author)

AD-414 889 Div. 8
(TISTE/CAM) OTS price $6.60

Scintilla Div., Bendix Corp., Sidney, N. Y.
RADIO INTERFERENCE GUARD (RIG) LOW-PASS RADIO FREQUENCY ATTENUATOR.
Technical rept. 1 Nov 62-30 June 63,
by Karl Kraus. 30 June 63, 1v.
Contract N178 8056
Unclassified report

Descriptors: (*Attenuators, Radiofrequency), (*Explosive initiators, Radiofrequency interference), (*Radiofrequency interference, Explosives initiators), Miniature electrical equipment, Electromagnetic waves, Theory, Operation, Electric potential, Circuits, Analysis, Environmental tests.

Work is presented towards the development of a miniature low pass radio interference attenuator device herein referred to as RIG (Radio Interference Guard). The objective is to develop and determine the most suitable design, materials, and construction techniques to obtain optimum efficiency and reliability of the RIG device as well as to fabricate prototype models and conduct necessary RF attenuation and environmental tests. A special design for a two unit RIG device was agreed. The work of developing and determining the most suitable two unit design, materials, and construction techniques for optimum efficiency and reliability is reported. (Author)

AD-414 894 Div. 8, 25
(TISTP/FEM) OTS price $1.60

Brown Engineering Co., Huntsville, Ala.
REFLECTION AND TRANSMISSION COEFFICIENTS FOR A PLASMA LAYER,
by J. M. Scarborough. Apr 63, 19p. TN R46
Contract DA01 0090RD1019
Unclassified report

Descriptors: (*Plasma sheath, Radio transmissions), (*Electromagnetic waves, Plasma medium), Attenuation, Electromagnetic wave reflections, Radiofrequency, Thickness, Absorption, Propagation, Electron density, Re-entry vehicles, Hypersonic planes, Numerical analysis.

Reflection and transmission coefficients are computed for a plane electromagnetic wave incident normally on a plane-parallel layer of uniform lossy plasma of finite thickness. Results are expressed in dimensionless form in order to extend their range of applicability. It is found that for layer thicknesses small compared to the wavelength, transmission should be appreciable even at frequencies below the plasma frequency. (Author)

AD-414 913 Div. 8, 26
(TISTM/REB) OTS price $9.10

Radio Corp. of America, Somerville, N. J.
PRODUCTION ENGINEERING MEASURE ON 2N1708 SILICON PLANAR EPITOXIAL TRANSISTOR.
Quarterly rept. no. 4, 1 Feb-30 Apr 63,
by A. Warren and ed. by L. R. Possemato.
30 Apr 63, 87p.
Contract DA36 039sc86729
Unclassified report

Descriptors: (*Transistors, Manufacturing methods), (*Manufacturing methods, Transistors), Cleaning, Epitoxial growth, Semiconductor devices, Chemical milling, Fixed contacts, Gold, Aluminum, Contamination, Bonding, Quality control, Reliability, Processing, Surfaces.

Process improvements were completed in all areas investigated. An improved method of removing photoresist was developed. A study of inorganic reagent materials as sources of semi-conductor surface contamination was completed. Conclusions concerning the concentrations of impurities and the effectiveness of various desorption techniques are included. The use of thin aluminum contacts has inhibited formation of ''purple plague''. Experiments with gold contacts were unsuccessful. The use of gold alloy wire did not materially improve the bond strength. Nailhead bonding with a smaller diameter gold wire to reduce the size of the ball met with only limited success. A program of reliability testing and analysis and studies of thermal resistance measurements form junction to ambient (T sub J-A) were completed. (Author)

AD-414 919 Div. 8, 25
(TISTP/WH) OTS price $5.60

Chalmers U. of Tech. (Sweden).
DYNAMIC NON-LINEAR WAVE PROPAGATION IN IONIZED MEDIA. 3. ELECTROMAGNETIC NON-LINEAR INTERACTION AND REFLECTION FROM A PLANE IONIZED MEDIUM,
by E. H. Rydbeck. 1963, 1v. Rept. no. 28
Contract AF61 052 451
AFCRL 63 637 Unclassified report

Descriptors: (*Radio waves, Ions), (*Ions, Radio waves), Reflection, Ionospheric propagation, Plasma medium.

It is the purpose of the research reported in this communication to study the reflection properties of an isotropic, ionized medium in the presence of non-linear effects produced in the medium by a separate, very powerful ''pump'' wave, of angular frequency wp. If a primary signal, or probing wave, of angular frequency wo, impinges on the disturbed, ionized medium at some specified angle, it is shown that, to first order, waves of frequencies, wo, wo + wp, and wo-wp are returned from the layer. (Author)

AD-414 949 Div. 8, 7
(TISTE/OHD) OTS price $8.10

Radio Corp. of America, Somerville, N. J.
DEVELOPMENT OF HIGH CURRENT TUNNEL DIODES FOR STATIC INVERTERS.
Final rept., 15 Apr 62-15 June 63,
by P. Gardner and F. Carlson. Aug 63, 79p.
Contract AF33 657 8964, Proj. 8128, Task 812808
ASD TR63 681 Unclassified report

Descriptors: (*Tunnel diodes, Electric currents), (*Electric current, Tunnel diodes), (*Inverters, Tunnel diodes), Gallium compounds, Arsenides, Effectiveness, Power equipment, Circuits, Design, Germanium, Theory.

Gallium arsenide tunnel diodes with peak current up to 900 amperes at efficiencies greater than 60 percent have been fabricated under this contract. Gallium arsenide tunnel diodes with peak currents as high as 3,000 amperes have also been fabricated, but with lower efficiencies. Germanium tunnel diodes with peak currents up to 300 amperes and efficiencies as high as 55 percent have been built under this contract. Other germanium tunnel diodes with peak currents up to 500 amperes at 48 percent efficiency have also been built. Gallium arsenide inverters providing output of 20 watts have been operated with the thermionic generators, and the feasibility of operating germanium tunnel diode inverters from thermoelectric generators has been demonstrated. The inverter delivered to the Air Force operated at 400 cps ± 4 percent with an output voltage of 140 volts ± 14 percent with power outputs up to 11.6 watts. (Author)

AD-414 990 Div. 8, 2
(TISTM/AM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTROMETEOROGRAPH FOR HELICOPTER (VEM),
by V. P. Belyayev, N. K. Vinnichenko, and L. A. Pakhomov. 26 July 63, 19p.
FTD TT63 632 Unclassified report

Descriptors: (*Meteorological instruments, Helicopters), Measurements, Temperatures, Resistance (Electrical), Pressure, Humidity, Circuits, Design.

AD-414 991 Div. 8
(TISTE/CAM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEVICE FOR MULTIPOINT REGULATION,
by A. B. Simkin and A. Kazymov. 22 June 63, 4p.
FTD TT63 431 Unclassified report

Trans. from Russian Patent No. 147043, (Appl. No. 673711/26, pp. 1-3, 19 July 1960.

Descriptors: (*Control systems, Electric switches), Temperature, Patents, Measurement, Fixed contacts.

AD-415 046 Div. 8, 30
(TISTE/JBM) OTS price $3.60

Engineering Development Lab., Naval Air Development Center, Johnsville, Pa.
DIGITAL TRANSDUCER RESEARCH PROGRAM 5935-M.
Annual progress rept. no. 1,
by John R. Wullert and Charles L. Bossard.
14 Dec 60, 33p.
TED Proj. ADC RS7045
NADC ED 6029 Unclassified report

Descriptors: (*Transducers, Digital systems), (*Digital systems, Transducers), Mechanical properties, Motion, Magnet coils, Magnetic fields, Armatures, Electric potential.

Efforts concerned the development of a digital transducer. A method was conceived to transform transducer rectilinear motion into a parallel binary pulse code by magnetic reluctance techniques. This noncontact technique generates digital signals representing the mechanical displacement of a magnetic armature, by successively altering the state of a matrix of magnetically permeable wire rods. The rods of the matrix are inductively coupled to the armature by an alternating or pulsed magnetic field. Sense windings about the rods are cross-connected to provide the desired code. Gray or natural binary digital codes can be provided. Several psuedotransducer models were fabricated to demonstrate the feasibility of the magnetic technique. The first model provided an output of three binary digits for a rectilinear motion of three-quarters of an inch. The maximum output signal from this model was 0.5 millivolt. In later models, the three binary digits were provided for a rectilinear motion of one thirty-second of an inch, and the maximum output signal was increased to 20 millivolts. Basic investigations revealed that: (1) The sense windings must be positioned as close as possible to the armature end of the rod; (2) a binary ''one'' and a binary ''zero'' can be generated simultaneously on the same rod; and (3) the armature signal is inductively coupled to the matrix through the magnetic rod and detected by the sense winding. (Author)

AD-415 051 Div. 8, 31
(TISTE/JBM) OTS price $6.60

Navy Electronics Lab., San Diego, Calif.
DLG(N)-35 COMMUNICATION ANTENNA ARRANGEMENT. SCALE-MODEL STUDIES OF PARALLEL-FED TOWER, 2-30 MC/S ANTENNAS,
by M. V. Eddy. 20 June 63, 61p.
NEL Rept. 1172 Unclassified report

Descriptors: (*Frigates, Antennas), (*Antennas, Frigates), High frequency, Antenna feeds, Antenna radiation patterns, Electromagnetic wave reflections, Ship models, Electrical impedance.

Through 1/48-scale model studies, a parallel-fed tower antenna arrangement was developed for the DLG(N)-35 which will permit HICAPCOM and NTDS communications. The system covers the 2-30 Mc/s frequency range in three bands: 2-6, 6-12, and 9-27 Mc/s. Design details are described and radiation patterns are included. (Author)

AD-415 059 Div. 8
(TISTM/EJH) OTS price $1.60

Curtiss-Wright Corp., East Paterson, N. J.
STUDY OF PROJECTION IATRON APPLICATION TO HIGH SPEED MULTICHANNEL PLOTTER.
Final rept.,
by Max Kerman. 16 Mar 63, 1v.
Contract N61339 1188
NTDC Rept. no. 1188 1 Unclassified report

Descriptors: (*Cathode ray tubes, Display systems), (*Storage tubes, Display systems), (*Television display systems, Storage tubes), Plotters, Feasibility studies, Brightness, Resolution.

An investigation was made of the feasibility of using the projection Iatron (FW-201) as the display readout device in a high speed multichannel electronic plotting display system. The primary task is the evaluation of its suitability as determined by its storage, resolution, brightness, and writing rate. Two regular projection Iatrons (FW-201) were tested. The tubes provided high brightness line traces (though somewhat lower than normal) but the resolution obtained at 6,000 and 9,500 foot-lamberts was 0.0625 inches at the screen. This is equivalent to 72 television resolution elements in a 4.5 inch display diameter. This resolution would be degraded still further at the rated saturation brightness value to about 60 television lines. These disappointing results in the resolution area were sufficient to terminate all further testing for the application and the feasibility study program was closed. (Author)

AD-415 067 Div. 8
(TISTE/PAR) OTS price $3.60

Hoffman Electronics Corp., Los Angeles, Calif.
DEVELOPMENT AND FABRICATION OF ANTENNA GROUP AN/GRA.
Quarterly progress rept. no. 2, 1 Apr 63-1 July 63
by F. C. Carpenter. 1 July 63, 29p.
Contract DA36 039sc90847
Unclassified report

Descriptors: (*Omnidirectional antennas, High frequency), Antenna configuration, Antenna radiation pattern, Measurements, Attenuation, Standing wave ratios, Helical antennas, Antenna masts, Antenna feeds, Antenna components, Ground vehicle antennas, Bandpass filters, Test equipment (Electronics), Test methods, Tests.

Design and development of an efficient antenna system which includes a tunable omnidirectional antenna capable of operating in the frequency range 1.5 to 20 mc, handling 2500 watts of average power, and receiving weak signals, is described in Signal Corps Technical Requirements SCL-5881, dated 13 March 1962. Antenna radiation tests for evaluating the antenna system are described in this report. Evaluation of the counterpoise ground system during high power operation of the antenna is covered. Attenuation and vswr tests of each filter section in the filter assembly are also described. (Author)

AD-415 080 Div. 8
(TISTE/CAM) OTS price $2.50

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
STUDY AND DEVELOPMENT OF HIGH TEMPERATURE (300 C) FREQUENCY CONTROL.
Rept. for 1 July 61-1 Jan 63,
by R. B. Belser, W. E. Woolf and L. L. Folsom.
July 63, 99p.
Contract AF33 616 8398, Proj. 4156, Task 415606
ASD TDR63 398 Unclassified report

Descriptors: (*Frequency, Control system), (*Radiofrequency oscillators, Frequency), High temperature research, Quartz resonators, Piezoelectric crystals, Delay lines, Magnetostrictive elements, Wiring diagrams, Processing, Measurement.

Literature or experimental investigations of possible oscillator devices of high stability over the temperature range -55 to 300 C have been made. AT-cut quartz resonators of 10 Mc frequency operated satisfactorily throughout the temperature range but the minimum frequency deviations observed were ± 730 ppm over the range -55 to 300 (angle of cut, theta = 36 deg. 42 min.) and ± 665 ppm over the range 0 to 300 C (theta = 36 deg. 48 min.). By summing the frequencies of 10 Mc AC- and 12 Mc BC-cut quartz resonators, of opposite temperature coefficients of frequency change, the deviation was reduced to ± 185 ppm over the range -55 to 300 C and ± 80 ppm over the range 25 to 300 C. Angles of cut for AC and BC units respectively were 30 deg. 45 min. and 60 deg. 00 min. for the former pair and 31 deg. 45 min and 56 deg 00 min. for the latter pair. Swept cultured quartz resonators exhibited lower rs changes over the temperature range than natural quartz and therefore maintained a higher Q. (Author)

AD-415 086 Div. 8, 2
(TISTE/CAM) OTS price $9.60

Washington State U., Pullman.
A RADIOMETER RECEIVER FOR SOLAR RESEARCH AT 480 MEGACYCLES.
by Jerry Ronald Pixton. 1963, 104p.
Unclassified report

Master's thesis.

Descriptors: (*Radiometers, Radio astronomy), (*Radioastronomy, Radiometers), Ultrahigh frequency, Gain, Antennas, Extraterrestrial radio waves, Electronic equipment, Circuits, Analysis, Measurement, Radiofrequency amplifiers.

The requirements for a solar radio astronomy facility were investigated. Criteria were established for the various component parts of the radiometer receiver to be used in the solar radio astronomy facility. A first generator total power radiometer receiver was designed and constructed. Nuvistors were used in a neutrode arrangement in the RF amplifier and first IF amplifier. Drift curves were obtained showing a minimum detectable noise temperature of 5.5 K and a gain fluctuation of 0.5%. A slowly varying component of the solar noise level was observed with a period of 15 to 20 minutes. Several Type 1 noise bursts were observed. The design of the second generation switched noise source comparison radiometer is also included. (Author)

AD-415 091 Div. 8, 5
(TISTE/JWS) OTS price $1.60

Electronic Defense Lab., Mountain View, Calif.
SENSITIVITY MEASUREMENTS OF RECEIVERS FOR PULSED SIGNALS,
by Harold A. Judy. 12 Nov 62, 8p. Rept. no. EDL G171
Unclassified report

Descriptors: (*Radio receivers, Sensitivity), (*Signal to noise ratio, Measurement), Pulse modulation, Test equipment (Electronics), Test methods, Reliability, Radio interference, Noise (Radio).

It is recommended that, whereever possible with linear tube type receivers, the EDL 4-db (meter) measurement be made. The resulting repeatability will allow the accurate detection of day-to-day sensitivity variations of a receiver. Also, performance in the field can be accurately compared with previous performance, with other operators, during development or test and integration. In cases where the lack of time or suitable equipment precludes use of the EDL 4-db (meter) measurement, the (S + N)/N = 2 measurement with minimum variation between operators. For measurements with receivers using transistor or logarithmic IF amplifiers and for all proposals and acceptance tests, the tangential sensitivity measurement should be made. Although there may be somewhat less repeatability between various operators, there will be more consistent results with transistor and logarithmic IF amplifiers and we will be more consistent when comparing receivers in various systems. (Author)

AD-415 095 Div. 8, 12, 26
(TISTE/CAM) OTS price $5.60

International Resistance Co., Philadelphia, Pa.
PRODUCTION ENGINEERING MEASURE FOR HIGH RELIABILITY, FIXED, FILM, PRECISION RESISTORS.
Quarterly progress rept. no. 2, 31 Mar-30 June 63,
by Richard C. Wagner. 30 June 63, 1v.
Contract DA36 039amc01461e
Unclassified report

Descriptors: (*Fixed resistors, Manufacturing methods), Processing, Quality control, Reliability (Electronics), Semiconducting film, Machines, Industrial production, Metal films, Mechanical drawings.

It was demonstrated that a burn-in schedule of 50% load 25 C, 1-1/2 hour on - 1/2 hour off for two weeks would guarantee an end product which would fulfill the ultimate MINUTEMAN reliability goal. A tentative plan for the complete in-process evaluation program has been laid out, and priority levels assigned. Seventeen studies have been started. Seven of the programs are reported, they are: (1) frit run on film; (2) film defects; (3) chemical contamination; (4)

irregular termination (flaked); (5) irregular termination (rough edge); (6) spiral skips; and (7) outgassed frit. The XLT resistor design has been improved by changing the rigid lead to a bellows assembly, thus simplifying the automatic machine design which is proceeding on schedule. A prototype sequential sealing machine has demonstrated hermetic seals equivalent to seals made on current production. The principle of Syntron bowl feeding was found to be acceptable for terminated ceramic substrates with respect to termination inspection. The termination machine design will utilize this principle. No processing difference between helium sealed units and nitrogen sealed units was observed, a statistical difference of TC-Hi and TC-Lo was noted. A lot of 531 type ceramics was shown to improve the process yield at Film Inspection about 5%. (Author)

AD-415 116 Div. 8
(TISTP/FEM) OTS price $1.10

Columbia U. School of Engineering, New York.
RESEARCH INVESTIGATION IN CONTROL SYSTEMS.
Final rept., 1 June-15 Sep 62,
by George M. Kranc. May 63, 8p. Rept. no. CU1 63AF144EE
Grant AF AFOSR62 144, Proj. 9768, Task 37650
AFOSR 4883 Unclassified report

Descriptors: (*Control systems, Optimization), (*Functional analysis, Control), Time, Linear systems, Nonlinear systems, Adaptive control systems, Analysis, Theory.

AD-415 154 Div. 8
(TISTE/JBM) OTS price $6.60

Melpar, Inc., Falls Church, Va.
MOLECULAR CIRCUIT DEVELOPMENT.
Quarterly rept. no. 13, 15 May-15 Aug 63.
15 Aug 63, 62p.
Contract NOw60 0362c
Unclassified report

Descriptors: (*Molecular electronics, Processing), (*Integrated circuits, Processing), (*Semiconducting films, Integrated circuits), (*Semiconductor devices, Integrated circuits), Dielectric films, High-temperature research, Vapor plating, Silcon alloys, Carbon alloys, Aluminum alloys, Antimony alloys, Silver alloys, Tellurium alloys, Selenium alloys, Cadmium alloys, Field emission, Neodymium compounds, Oxides, Coolings, Capacitors, Current limiters, Electric insulation, Oscillators, Relaxation oscillators, Gamma rays.

Research was continued on a program to conduct research and development on materials and techniques suitable for exploitation in the formation of molecular circuits. The current emphasis in materials research is on semiconductive and dielectric films for high-temperature application. Semiconductive films are being produced by the usual film-forming techniques: chemical vapor deposition as with silicon carbide, cathodic sputtering as with aluminum antimonide and silver telluride, and vacuum evaporation as with cadmium selenide. Attention is currently being directed toward the amorphous semiconductors. Characterization of mixed neodymium oxide-boric oxide films constitutes the chief effort in the area of dielectric films. Properties of high-temperature capacitors are being systematically investigated. Intensive work on field effect devices continues. Theoretical predictions concerning the functioning of devices as current limiters were satisfied in experimentally determined circuit characteristics. A voltage-controlled oscillator circuit comprised entirely of thin-film components is also described. (Author)

AD-415 155 Div. 8
(TISTM/EJH) OTS price $3.60

Brown Engineering Co., Huntsville, Ala.
RADIO FREQUENCY TRANSMISSION THROUGH A PLASMA GENERATED IN THE NOSE REGION OF A HIGH VELOCITY GROUND-TO-AIR MISSILE.
by H. C. Crews, Jr., B. E. Pope, V. L. Reed and J. E. White, Jr. 8 Aug 62, 30p. Technical note R7
Unclassified report

Descriptors: (*Radar signals, Attenuation), (*Guided missiles, Radar signals), (*Attenuation, Radar signals), Radiofrequency, Wave transmission, Rocket noses, Shock waves, Mathematical analysis.

An estimate of absorptive and reflective attenuation is calculated for signal transmission in the 1 to 1000 KMC range through the nose (normal shock) region of a proposed seeker-equipped high velocity ground-to-air missile. (Author)

AD-415 173 Div. 8, 25
(TISTP/FEM) OTS price $7.60

Chalmers U. of Tech. (Sweden).
DYNAMIC NON-LINEAR WAVE PROPAGATION IN IONIZED MEDIA. NON-LINEAR INTERACTION BETWEEN AN OBLIQUELY INCIDENT PLANE ELECTROMAGNETIC WAVE AND AN ELECTRON BEAM.
by K. H. B. Wilhelmsson. 1 Apr 63, 67p. Research rept. no. 36
Contract AF61 052 451
AFCRL 63 830 Unclassified report

Descriptors: (*Propagation, Electromagnetic waves), (*Electromagnetic waves, Electron beams), Magnetic fields, Electron density, Magneto-optic effect, Ionization, Plasma medium, Electrons, Oscillation, Scattering, Resonance, Equations, Electric fields, Space changes, Doppler effect, Polarization.

AD-415 178 Div. 8
(TISTE/OHD) OTS price $8.60

Little, Arthur D. Inc., Cambridge, Mass.
AN INTRODUCTION TO MODULATION, CODING, INFORMATION THEORY, AND DETECTION.
by Gordon Raisbeck. Dec 62, 80p. 1291262
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Report on Proj. Trident.

Descriptors: (*Communication theory, Handbooks), Statistical analysis, Communication systems, Multichannel telephone systems, Coding, Probability, Theory, Modulation.

This is an expository essay on information theory for engineers interested in communications, sonar, and radar who have no specialized knowledge of statistical communication theory. The fundamental concepts of information theory, and in particular, quantity of information and channel capacity, are defined and explained in simple terms. These concepts are used to make a quantitative estimate of the performance of several common modulation schemes and to analyze the performance of search and detection

systems. The effectiveness of repeated or prolonged observations on detection thresholds and reliability of detection, and the relative performance of coherent and incoherent integration, are explained and illustrated quantitatively. (Author)

AD-415 186 Div. 8
(TISTP/FB) OTS price $1.60

Kiruna Geophysical Observatory (Sweden).
VERY LOW FREQUENCY RADIO WAVE PROPAGATION AT HIGH-LATITUDES,
by Alv Egeland and Willi Riedler. 25 June 63, 22p. Scientific rept. no. 1
Contract AF61 052 678
AFCRL Rept. no. 63 856 Unclassified report

Descriptors: (*Ionospheric propagation, Very low frequency), Radio waves, Very low frequency, Intensity, Diurnal variations, Periodic variations, Terrestrial magnetism, Sunspots.

Diurnal, seasonal and yearly variations of the normal 16 kc signal strength from the Rugby (GBR) transmitter were studied on the basis of data accumulated during approximately five years of continuous recording (September 1958 to May 1963) at Kiruna Geophysical Observatory. The observed day-night variation of the 16 kc signal strength is discussed in terms of the mode theory of propagation, in a first-order approximation. For the case when the night-time signal level is lower than the daytime level (as for the years 1958 to 1961), an increase of apparent reflection heights from 70 km at day to 80-85 km at night can explain the observation. An increase in reflection heights of say 5 to 10 km both during night and day, may explain the observations obtained during the more quiet ionospheric conditions in 1961 to 1963; namely that the night-time signal strength was of greater intensity than that during the daytime. The reception of 16 kc Rugby transmissions at Uppsala supports this conclusion. The marked decrease in ionospheric absorption for the periods when the night-time level of the 16 kc signal strength exceeded the day-time level, can be understood if the region, where the main part of the ionospheric absorption, as well as the reflection of very low frequency waves takes place, was some kilometers higher than during the remainder of the observation period. (Author)

AD-415 188 Div. 8, 15
(TISTE/JWS) OTS price $1.60

Mitre Corp., Bedford, Mass.
ANALYSIS OF SIGNAL INTERFERENCE GENERATED WITHIN A LIMITER,
by R. L. Greenspan and J. Petrishen. Aug 63, 12p.
Rept. no. W5369
Contract AF33 600 39852, Proj. 600
ESD TDR63 257 Unclassified report

Descriptors: (*Limiters, Radiofrequency interference), (*Radiofrequency interference, Limiters), Mathematical models, Bessel functions, Mathematical analysis, Attenuation, Distortion, Electronic counter-countermeasures, Tables, Bandpass filters.

A limiter is modeled as an ideal clipper cascaded with a bandpass filter. The nonlinear clipper characteristic is analyzed as a linear sum of sinusoids in order to determine signal modulation frequencies generated within the clipper and which pass through the filter. The representation leads to evaluation of modulation component amplitudes as sums of Bessel Functions, or, equivalently, as integrals of Bessel Functions. The cases of a single narrowband input, and two interfering sinusoids, are considered in detail. References to the literature concerning signal-to-noise ratio calculations in systems using a limiter are listed in the references. (Author)

AD-415 219 Div. 8, 25
(TISTE/OHD) OTS price $2.60

Mitre Corp., Bedford, Mass.
RADAR SYSTEMS AND TECHNIQUES DEPARTMENT MICROWAVE TECHNIQUES SUBDEPARTMENT. JANUARY 1, 1963-MARCH 31, 1963.
Aug 63, 16p. Rept. no. PM22
Contract AF19 628 2390, Proj. 750
ESD TDR63 297 Unclassified report

Descriptors: (*Parametric amplifiers, L band), (*Antennas, Polarization), (*Lasers, Ruby), Cryogenics, Phase distortion, Electron beams.

This document reports the progress of the Microwave Techniques Subdepartment from January 1, 1963 to March 31, 1963. The work of the Subdepartment centers about the design, fabrication and evaluation of microwave techniques and components which have application to long-range radar and communication problems. (Author)

AD-415 224 Div. 8, 5
(TISTE/JBM) OTS price $2.60

Electronic Defense Lab., Mountain View, Calif.
MODIFIED TABLES FOR THE DESIGN OF OPTIMUM DIPLEXERS,
by R. G. Veltrop and R. B. Wilds. 3 July 63, 22p. Technical memo. no. EDL M559
Contract DA36 039amc00088 E
Unclassified report

Descriptors: (*Electric filters, Polynomials), (*Tables, Electric filters), Frequency, Mathematical analysis, Low-pass filters, High-pass filters, Switching circuits, Frequency shift, Design.

A set of modified tables for the design of quasi-complementary Chebyshev filters for diplexer use is presented. Use of the tables in conjunction with the straightforward design procedure outlined makes it possible to design optimum diplexer circuits. Mathematical and experimental verification of the validity of the modified values is discussed. (Author)

AD-415 225 Div. 8, 6
(TISTE/JBM) OTS price $14.00

General Electric Co., Schenectady, N. Y.
RESEARCH AND DEVELOPMENT OF SUPERPOWER THYRATRONS, PHASE II-b.
Final rept., 25 Aug 57-31 May 63,
by A. W. Coolidge. 31 May 63, 193p. RN16
Contract DA36 039sc74850, Task 1G6 22001A055 02
Unclassified report

Descriptors: (*Thyratrons, Radar equipment), (*Radar equipment, Thyratrons), Hydrogen, Radar pulses, Modulators, Cooling, Cathodes (Electron tubes), Coatings, Pressure, Tests, Life expectancy, Water, Liquid cooled, Anodes (Electron tubes), Ceramic materials, Temperature, Current regulators, Power, Electric potential, Electronic switches.

This report describes the work performed during Phase II-b of a three-phase program for development of superpower hydrogen thyratrons for radar pulse modulator switching service. Objective ratings and other design requirements are specified. The thyratron development program

included a study on cooling techniques, new cathode coatings, reservoir designs and methods of controlling hydrogen pressure, and various envelope configurations. Initial test data and life data are given. Five thyratrons were delivered, three of which were life tested for 500 hours or more. The resulting final design of the hydrogen thyratron is a ceramic-metal design having an external anode with provisions for water cooling of the anode, gradient grid, control grid, and reservoir environment. (Author)

AD-415 258 Div. 8, 7, 25
(TISTE/JBM) OTS price $7.60

Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
SUPERCONDUCTING MAGNET RESEARCH AND APPLICATION TO MHD POWER GENERATORS.
Quarterly technical progress rept. no. 2, 1 May-31 July 63,
by Ronald R. Akers. 15 Aug 63, 1v.
Contract AF33 657 10567, Proj. 8173, Task 817306 16
Unclassified report

Descriptors: (*Magnets, Superconductivity), (*Superconductors, Magnetohydrodynamics), (*Generators, Magnetohydrodynamics), (*Magnetohydrodynamics, Superconductivity), Power equipment, Spaceborne, Theory, Magnetic fields, Models (Simulation), Transients, Mathematical analysis, Thermal radiation, Electric potential, Propagation, Hall effects, Materials.

Research concerns an investigation of the recently developed superconducting magnets and their application to MHD power generators for space use. The work will include theoretical analysis of an MHD generator with particular emphasis on the magnetic field requirements and a study of the problems of superconducting magnet design to fulfill these requirements. To attain this end, models of a superconducting magnet, cooling equipment and an MHD generator will be analyzed. The total power system including a reactor heat source and radiator will then be optimized on a power to weight basis to find the optimum magnetic field. With this completed, a comparison will then be made between superconducting magnets and conventional magnets to illustrate the advantages or disadvantages of both. (Author)

AD-415 259 Div. 8
(TISTE/JBM) OTS price $1.60

Bolt Beranek and Newman Inc., Cambridge, Mass.
SPHERICAL DIRECTIVE ARRAYS: A PRELIMINARY STUDY.
Mar 63, 17p. Rept. no. 1300363
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Subcontract to Arthur D. Little, Inc., Cambridge, Mass., Contract NObsr81564.

Descriptors: (*Antennas, Spheres), (*Antenna configurations, Spheres), (*Sound signals, Antennas), Sensitivity, Electroacoustic transducers, Propagation, Beams (Electromagnetic).

The performance of directive receiving arrays is analyzed for spherically symmetric arrays, transparent to sound. Results are developed for two cases, where sensitivity is limited either to a then shell or to a complete spherical volume. In both cases, the magnitude of the sensitivity is uniform, but there is phase compensation appropriate to a plane wave travelling in a single direction. Effects of finite spacing between transducers in a point array are discussed qualitatively and briefly. (Author)

AD-415 260 Div. 8
(TISTM/BRW) OTS price $5.60

Little, Arthur D. Inc., Cambridge, Mass.
RELIABILITY OF UNATTENDED ELECTRONIC EQUIPMENT.
Technical rept.
Sep 61, 47p. Rept. no. 1130961
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Report on Project TRIDENT.

Descriptors: (*Electronic equipment, Reliability (Electronics)), (*Naval equipment, Electronic equipment), Failure (Mechanics), Mathematical analysis, Airborne, Shipborne, Environmental tests, Meterological satellites, Satellites (Artificial).

The following rule summarizes the average performance observed for various classes of military electronic systems: the mean time to first failure of a unit (MTTF) is inversely proportional to its complexity. Depending on the environment in which the equipment operates, the following relationships obtain: MTTF (hours) x N (number of electronic components)= 2.5 x 10 to the 4th power airborne environment, 1.25 x 10 to the 5th power shipborne and ground mobile environment, 1 x 10 to the 6th power laboratory environment. Unattended electronic systems such as have been proposed for ocean surveillance give rise to an entirely new order of problems. Since their operating lifetimes must be as much as 100 times longer than those of their manned counterparts, the accepted standards of ''high reliability'' are completely inadequate. (Author)

AD-415 289 Div. 8
(TISTP/FEM) OTS price $.50

Electronic Technology Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ACCURACY OF AN AUTOMATIC SECOND DERIVATIVE PLOTTER.
Final rept.,
by G. K. Medicus. July 63, 13p.
Proj. 4152, Task 415202
ASD TDR63 471 Unclassified report

Descriptors: (*Plotters, Automatic), (*Plasma physics, Instrumentation), Errors, Signals, Resistors, Noise, Harmonic analyzers, Curve fitting, Simulation, Probes (Electromagnetic), Electric currents, Diodes (Semiconductor), Silicon, Electric potential.

The influences of the finite signal amplitude, delta V, the finite current sensing resistor, R sub J, the signal-producing resistor, R sub S, the noise, and the system hysteresis on the second harmonic curves of an automatic second derivative plotter are determined experimentally for a simulated probe (Si-diode) and for a real Langmuir probe. It is found that, in general, undistorted second derivative curves are obtainable without any of the three quantities having to be excessively low. (Author)

AD-415 352 Div. 8, 25
(TISTP/FEM) OTS price $16.50

Physical Electronics Research Lab., Inst. of Tech., U. of Minn., Minneapolis.
RESEARCH IN PHYSICS OF ELECTRON EMISSION AND ELECTRON TUBE TECHNOLOGY.
Interim rept. no. 1, 16 Oct 62-15 Apr 63,
by D. E. Anderson and W. T. Peria. 15 Apr 63, 214p.
Contract AF33 657 10475, Proj. 4156, Task 415605
Unclassified report

Descriptors: (*Metal films, Ceramic coatings), (*Superconductors, Emissivity), (*Secondary emission, Films), Magnesium compounds, Aluminum compounds, Oxides, Germanium, Crystals, Beryllium, Titanium, Oxide cathodes, Barium, Electrons, Diffraction, Reflection, Photochemistry, Electric currents, Gold, Semiconductors, Surface properties, Electron bombardment, Thermionic emission, Semiconducting films, Electron tubes.

Further experiments on the dependence of secondary yield on the angle of incidence are reported. The energy distribution of electrons transmitted through gold films is described and progress in the theory of the production of secondary electrons is outlined. Studies of thin-film tunnel current diodes and triodes are reported; studies of hot electron injection from an electron beam into such devices are reported. Several experiments relating to BaO, (BaSr)O and BaS cathodes are described. Further results of surface studies of MgO and of the Ge:Na system are given. Some experimental results which help to clarify the bombardment induced desorption of gases from metals are presented. Two experiments on the electron emission from superconductors are described. (Author)

AD-415 363 Div. 8
(TISTE/JWS) OTS price $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
APPLICATION OF ELECTROMAGNETIC ABSORBING MATERIALS AS INTERFERENCE REDUCTION TECHNIQUES,
by Leon Peters, Jr. Aug 63, 9p.
Contract AF30 602 2711, Proj. 4540, Task 454003
RADC TDR63 273 Unclassified report

Descriptors: (*Horn antennas, Antenna radiation patterns), (*Radiofrequency interference, Antenna lobes), Thickness, Electromagnetic fields, Diffraction, Mathematical prediction, Electromagnetic properties, Electromagnetic wave reflections.

The radiation pattern of a thin-walled pyramidal horn is analyzed by the geometrical theory of diffraction. The calculated pattern agrees well with measured results over the entire pattern, including backlobes. Measured patterns of thick-walled horns are presented and the significance of wall thickness is noted. The importance of edge structure for RFI reduction is discussed. (Author)

AD-415 364 Div. 8
(TISTE/OHD) OTS price $2.75

Stanford Research Inst., Menlo Park, Calif.
TUNNEL CATHODES FOR MICROWAVE TUBES.
Final rept.,
by D. V. Geppert and B. V. Dore. June 63, 141p.
Contract AF33 657 8721, Proj. nos. 4156 and 4125, Task 415603
ASD TDR63 672 Unclassified report

Descriptors: (*Cold cathode tubes, Electron tube parts), (*Cathodes (Electron tubes), Metal films), (*Field emission, Cathodes (Electron tubes)), Dielectric films, Quantum mechanics, Niobium compounds, Oxides, Cadmium compounds, Sulfides, Silicon compounds, Monoxides.

This program consisted of a theoretical and experimental study of the electron emission into vacuum from metal-insulator-metal (M-I-M) sandwiches. Analyses are presented for the conduction mechanisms through thin insulating films, for the generation of hot electrons in M-I-M structures, for the transport of hot electrons through thin metal films, and for the emission into vacuum of hot electrons in metal. Details are presented of the work on various combinations of metals and insulators in experimental M-I-M cathodes. Recommendations for future work are made. (Author)

AD-415 365 Div. 8, 26
(TISTE/CAM) OTS price $8.60

Clevite Transistor Products, Waltham, Mass.
PRODUCTION ENGINEERING MEASURE FOR IMPROVEMENT OF GERMANIUM ALLOY POWER TRANSISTORS.
Quarterly progress rept. no. 4, 31 Jan-30 Apr 63, by John I. Kelly. 30 Apr 63, 53p.
Contract DA36 039sc86724
Unclassified report

Descriptors: (*Transistors, Power), (*Manufacturing methods, Transistors), Germanium, Coatings, Humidity, Soldering, Measurement, Reliability (Electronics).

Life test results are discussed for transistors on which surface passivation by oxidation was attempted. Results are discussed on surface passivation by organic coats according to the new procedure. Results are presented for Humidity Testing of pre-capped units. Results on the use of molecular sieve and calcium sulphate are discussed. Methods of improving soldering of the new clip are outlined. The program involving 10 mil collectors is presented. Program on the new tray, clip blower and hand tested is presented. The helium leak detector is now is operation on a 100% basis. Results on reliability measurements of transistors are presented. (Author)

AD-415 371 Div. 8
(TISTE/JBM) OTS price $8.60

Electron Physics Lab., U. of Michigan, Ann Arbor.
INVESTIGATION OF LARGE-SIGNAL TRAVELING-WAVE TUBES,
Quarterly progress rept. no. 3,
by G. T. Konrad, J. E. Rowe and others. Aug 63, 87p.
Contract AF30 602 2834, Proj. 5573, Task 557303
RADC TDR63 284 Unclassified report

Descriptors: (*Traveling wave tubes, Analysis), (*Klystrons, Analysis), Electron guns, Magnetic fields, Microwave amplifiers, Digital computers, Programming (Computers), Space charges, Velocity, Phase shifters, Noise (Radio), Electric currents, Cathodes (Electron tubes), Gain, Effectiveness, Equations, S-band, Helixes, Frequency, Electrostatic fields.

A digital computer program is used to obtain solutions to a two-dimensional nonlinear analysis for large-signal traveling-wave devices and klystrons. Various values of axial magnetic field and space charge are used in the solutions. Theoretical work in the solution of large-signal phenomena in multi-stream microwave devices by a density function method is presented. Some of the results obtained in checking out the computer program are shown. Phase shift data for a velocity tapered tube is compared with that for a conventional tube. Under certain conditions the former is found to be more desirable from a standpoint of phase shift. Extensions and modifications to the digital computer programs for electron guns are described. Relativistic effects

and arbitrary axially symmetric magnetic fields can be taken into account. Some of the considerations in employing a Crestratron in a low-noise high-power amplifying chaing are described. Several techniques are presented in keeping the noise figure low in a Crestatron. (Author)

AD-415 372 Div. 8
(TISTE/JBM) OTSprice $1.60

Harry Diamond Labs., Washington, D. C.
VERY BROADBAND COAXIAL-TO-RIDGE WAVEGUIDE TRANSITIONS.
by Paul J. Muenzer. 16 Aug 63, 21p.
Proj. 26300
HDL TR1157 Unclassified report

Descriptors: (*Waveguide couplers, Broadband), (*Antennas, Waveguide coupers), (*Coaxial cables, Waveguides), (*Waveguides, Coaxial cables), Ultrahigh frequency, Standing wave ratios, Horn antennas, Antenna feeds, Impedance matching, Electrical impedance.

A very broadband coaxial-to-ridge waveguide transition has been designed for use in antennas and ridge waveguide components. A description of the transition design procedures and performance data are presented. The transition was initially designed to operate in the frequency range from 0.8 to 2.3 Gc with a voltage standing wave ratio (VSWR) of less than 1.8. The results indicate that the design performs better than the specified requirements. When used as a feed for an electromagnetic horn, the VSWR was less than 1.7 from 0.85 to 2.7 Gc and less than 2.0 in the frequency ranges of 0.6 to 3.1 Gc and 4.1 to 4.9 Gc. (Author)

AD-415 388 Div. 8
(TISTP/FEM) OTS price $4.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
RADIATION FROM A DIPOLE IN AN INFINITE, HOMOGENEOUS, ANISOTROPIC PLASMA,
by E. Arbel and L. B. Felsen. 25 Sep 62, 1v.
Research rept. PIBMRI1070 62
Contract AF19 604 4143, Proj. 5635, Task 56350
Unclassified report

Descriptors: (*Dipole antennas, Electric fields), (*Plasma medium, Electromagnetic fields), Antenna radiation patterns, Radiators, Diffraction, Propagation, Magnetic fields, Electric currents, Oscillation, Fourier analysis, Bessel functions, Integrals, Refractive index.

A previously derived solution is specialized here to the study of the radiation field due to an electric current dipole in an infinitely extended, homogeneous anisotropic plasma. The asymptotic field solution is interpreted in terms of rays along which energy propagates from the source to the observation point. The number of contributing rays, varying from zero to four, depends on the constitutive parameters and is determined by the refractive index curves for the medium. Special attention is given to transition phenomena associated with refractive index curves which have points of inflection or unbounded branches. A set of representative radiation patterns has been calculated. (Author)

AD-415 412 Div. 8
(TISTM/ODN) OTS price $10.50

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
AGING CHARACTERISTICS OF QUARTZ CRYSTAL RESONATORS.
Final technical rept., 15 Feb 61-15 Feb 63,
by R. B. Belser and W. H. Hicklin. 15 Feb 63, 129p. Rept. no. 8
Contract DA36 039sc87407, Proj. A552, Task 3A 99 15 004
Unclassified report

Descriptors: (*Quartz resonators, Aging (Materials)), (*Crystals, Quartz resonators), Manufacturing methods, X-ray diffraction analysis, Test equipment, Crystal ovens, Bonding, Plating, Electrodes, Aluminum, Gold Gamma rays, Neutron beams, X-ray photography, Data, Degasification, Radiation damage, Electrical properties, Frequency, Stability.

Over three hundred AT-cut quartz resonators of 16 Mc fundamental frequency were meticulously fabricated, stored at 85 C and measured for frequency stability in the fundamental, third and fifth modes over periods of 3 to 15 months. Controlled variables introduced were types of quartz, plating metal, bonding cement, and mounting envelope. Accuracy of measurements was a few parts in 10 to the 9th power. Observations made previously with regard to aging being greater and more erratic at the fundamental than at the overtone modes were confirmed. The better units, coated with single layer electrodes of aluminum or gold changed frequency <2 parts in 10 to the 8th power per month and those coated with bimetal layers of Al + Au changed only slightly more. Resonators plated with Al + Al exhibited changes several times greater. Bilayer electrodes of all types, in general, induced greater frequency changes than single layer electrodes and greater susceptibility to frequency shifts due to inadvertent temperature cycling (oven failure and oven opening). (Author)

AD-415 438 Div. 8, 30
(TISTE/OHD) OTS price $3.60

Remington Rand Univac Div., Sperry Rand Corp., Philadelphia, Pa.
RESEARCH ON LOW-POWER MAGNETIC-FILM MEMORIES.
Interim engineering rept. no. 1, 14 May-14 Aug 63,
by T. J. Matcovich. 14 Aug 63, 25p. BPSN no. 3 6779 4159 05
Contract AF33 657 11199
Unclassified report

Descriptors: (*Thin films (Storage devices), Microminiaturization (Electronics)), (*Computer storage devices, Computer logic), (*Molecular electronics, Timing circuits), Amplifiers, Vapor plating, Fixed resistors, Circuits, Capacitors, Magnetic materials, Design, Memory.

The objective is to demonstrate the feasibility of fabricating microminiaturized evaporated circuitry for use with the low-power magnetic-film memory elements. The layout of a 64-word, 24-bit-per-word memory system, complete with address registers and timing circuits, was completed. This layout is used to ensure the compatibility of individual circuit designs with the system. A word driver, two bit drivers, and a sense amplifier have been designed and breadboard models have been constructed and tested. Word drivers have been evaporated and a driver has been used to operate bits on a 4-by-4 memory array. Bit drivers have been evaporated but not tested. The physical layout of the sense amplifier is being designed. Techniques for the preparation of evaporated resistors have been improved to the extent that resistance tolerance is now ±15 percent. Large memory arrays of 64 words, 24 bits per word have also been successfully evaporated. Disturb tests have been performed on individual bits. The disturb-current margin on good films is about 100 percent, even after 10 to the 4th disturb pulses are applied. (Author)

Division 9 - FLUID MECHANICS

9. FLUID MECHANICS

AD-414 131 Div. 9
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
VIBRATIONS AND STABILITY OF A RIBBED CYLINDRICAL SHELL IN A FLOW OF COMPRESSIBLE LIQUID,
by B. M. Bublik. 27 June 63, 6p.
FTD TT63 647 Unclassified report

Trans. from Dopovidi AN UKR RSR, no. 2, pp. 178-183, 1963.

Descriptors: (*Stiffened cylinders, Stability), (*Structural shells, Compressible flow), Vibrations, Elasticity, Equations, Numerical analysis.

AD-414 236 Div. 9, 1, 30
(TISTA/VGW) OTS price $10.10

Wichita U. School of Engineering, Kans.
TABULATED PRESSURE DATA FOR A SERIES OF CIRCULAR, ANNULAR JET GROUND EFFECT MACHINE MODELS.
June 62, 1v. Engineering rept. no. 352 8
Contract NONR201 3
Unclassified report

Descriptors: (*Ground effect machines, Model tests), Tables, Experimental data, Annular nozzles, Aerodynamic slots, Pressure, Angle of attack.

This volume is one of six, presenting tabulated pressure data for a series of circular, annular jet ground effect machine models. The pressures listed are the differential above and below atmospheric in pounds per sq. ft. A heading on top of each page identifies the test point presented and provides auxiliary information which may be useful in interpreting the columnar data. (Author)

AD-414 393 Div. 9, 1
(TISTA/GEC) OTS price $19.75

Wichita U., School of Engineering, Kans.
TABULATED FORCE AND MOMENT DATA FOR A SERIES OF CIRCULAR, ANNULAR JET GROUND EFFECT MACHINE MODELS,
by Claude A. Foltz. Feb 62, 1v. Engineering rept. no. 352 7
Contract NONR201 03
Unclassified report

Descriptors: (*Ground effect machine, Pressure), Annular nozzles, Wind tunnel models, Model tests, Aerodynamic characteristics, Experimental data, Design, Moments.

Wind tunnel were conducted on 9 circular, annular jet, ground effect machine models. The effects of slot width, convergence angle of the jet and operating height on the dynamic performance of this type of vehicle were inspected. Slot thickness to model diameter ratios of 1, 5, and 10% were tested utilizing convergence angles of 0, 30 and 60 degrees. (Author)

AD-414 466 Div. 9
(TISTM/BRW) OTS price $7.60

General Dynamics Convair, San Diego, Calif.
EXPERIMENTAL INVESTIGATION OF SUPERCAVITATING HYDROFOIL FLUTTER PHENOMENA,
by Robert C. Peller and Louis M. Figueroa.
Aug 63, 74p. Rept. no. GDC63 132A
Contract NObs86810, Proj. SF013 02 01, Task 1719
Unclassified report

Descriptors: (*Hydrofoils, Flutter), (*Fluid flow, Hydrofoil), Hydrodynamics, Elasticity, Cavitation, Model tests, Vibration, Resonance, Experimental data, Test facilities.

Tests were made to obtain the experimental flutter characteristics of a supercavitating hydrofoil with a control surface. No attempt is made to fix a theory to the data; rather, the data are presented just as obtained. In general, the foil responses obtained resulted in two flutter speeds per configuration. Each flutter condition was a limited-amplitude sinusoidal oscillation. The control surface participated in each flutter mode and torsion was present in the flutter mode at 40 fps. Very little bending was noted in any supercavitating flutter mode. The speed may be increased to speeds above the flutter speed with increasing stability; however, prolonged running at the flutter speed may result in fatigue failure or difficulties affecting passenger comfort. (Author)

AD-414 468 Div. 9, 22
(TISTP/JP) OTS price $2.60

Institute of Engineering Research, U. of Calif., Berkeley.
THE METHOD OF NEAR CHARACTERISTICS FOR UNSTEADY FLOW PROBLEMS IN TWO SPACE VARIABLES.
by Maurice Holt. June 63, 18p. Report AS63 2
Contract Nonr 22279
Unclassified report

Descriptors: (*Shock waves, Underwater). (*Underwater explosions, Mathematical models). Partial differential equations, Fluid flow, Transformations (Mathematics). Difference equations, Charges (Explosive). Nuclear explosions, Reflection, Matrix algebra, Detonation waves, Explosion bubbles.

Sauer's new approach to hyperbolic problems involving more than two independent variables is discussed and applied to underwater shock wave problems. In the case of plane, unsteady problems depending on time t and Cartesian coordinates x,y the charactristic lines of the governing equations in the x,t plane are found and a finite difference scheme based on these lines and lines parallel to the y axis is developed. In this way a two dimensional unsteady problem is solved as a sequence of one dimensional problems in planes y = constant. This scheme is much simpler than earlier schemes based on bicharacteristics. (Author)

AD-414 555 Div. 9
(TISTP/MFA) OTS price $4.60

Boeing Scientific Research Labs., Seattle, Wash.
SLENDER, AXISYMMETRIC POWER BODIES HAVING MINIMUM ZERO-LIFT DRAG IN HYPERSONIC FLOW,
by Arthur H. Lusty Jr. July 63, 25p. D1 82 0275; Flight sciences lab. technical rept. no. 77
Unclassified report

Also available from the Author.

Descriptors: (*Bodies of revolution, Drag), (*Hypersonic flow, Theory), Pressure, Friction, Functions, Determinants, Optimization, Axially symmetric flow.

The problem of finding the slender power body of revolution having minimum zero-lift drag in hypersonic flow is solved by direct methods. A constant friction coefficient is assumed,

and both the Newtonian impace law and the Newton-Busemann law are employed to provide the distribution of pressure coefficients over the body. A generalized optimum condition is found in determinantal form under the assumption that any two arbitrary functions of the diameter, the length, the wetted area, the volume, and the exponent of the power body are prescribed. After these constraints are specified explicitly, particular problems are solved; it is found that, in all cases where the wetted area is not prescribed, the shape of the optimum power body is strongly dependent on the friction coefficient. It is found that the drag of the optimum power body approximates closely that of the variational solution body only in the cases where the diameter is one of the prescribed quantities. (Author)

AD-414 567 Div. 9
(TISTP/WH) OTS price $6.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
PRESSURE DISTRIBUTION AND FLOW VISUALIZATION TESTS OF A 1.5 ELLIPTIC CONE AT MACH 10,
by R. L. Palko and A. D. Ray. Aug 63, 55p.
Contract AF40 600 1000 ARO Proj. VC0330
Task 136607
AEDC TDR63 163
Unclassified report

Descriptors: (*Conical bodies, Hypersonic flow), Load distribution, Wind tunnels, Angle of attack.

Results are presented for tests conducted on a 1.5 elliptic cone to determine the pressure distribution, flow streamlines, and shock wave shape at high angles of attack. The tests were performed at a Mach number of 10 and a free-stream unit Reynolds number of 1.6 x 10 to the 6th power per foot. The angle-of-attack range was from 0 to 60 deg. The model was oriented both with the major and the minor axis of the ellipse located in the pitch plane. (Author)

AD-414 637 Div. 9
(TISTP/JP) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
ON THE ORIGIN OF SHOCKWAVES FROM SPHERICAL CONDENSED EXPLOSIONS IN AIR - PART 1. RESULTS OF PHOTOGRAPHIC OBSERVATIONS OF PENTOLITE HEMISPHERES AT AMBIENT CONDITIONS,
by L. Rudlin. Aug 63, 1v.
NOLTR 62 182; DASA 1360 Unclassified report

Descriptors: (*Shock waves, Explosions), (*Detonation waves, Photographic analysis), Pentolite, Explosive materials, Detonations, Spheres, Air.

The phenomena occurring during the explosion of pentolite hemispheres are observed using the Beckman-Whitley camera operated at 0.5-upsilion second intervals. Because of the hemispherical shape, the detonation wave may be followed through the explosive and the resulting airshock followed through the air (for two charge radii). The observations indicate that the airshock formed outside the explosive results from the transmission of the detonation shockfront into the air. The airshock velocity appears to remain constant, at the detonation-velocity value of 7730 m/sec, for several microseconds before decaying in the usual airshock fashion. Comparisons of the hemispherical results are also made with previously unpublished spherical results from Naval Ordnance Laboratory (NOL) experiments and from earlier measurements. There are several discrepancies among these three sets of data revealed by the comparison but not resolved. (Author)

AD-414 681 Div. 9, 15
(TISTA/VGW) OTS price $4.60

Rand Corp., Santa Monica, Calif.
SIMILAR SOLUTIONS OF THE LAMINAR BOUNDARY-LAYER EQUATIONS WITH VARIABLE FLUID PROPERTIES.
by Joseph F. Gross and C. Forbes Dewey, Jr.
Aug 63, 31p. Memo. no. RM3792 PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Laminar boundary layer, Mathematical analysis), (*Hypersonic flow, Laminar boundary layer), Numerical analysis, Partial differential equations, Differential equations, Temperature, Heat transfer, Viscosity, Enthalpy, Pressure, Stagnation point, Shear stresses.

Certain numerical solutions to the laminar boundary-layer similarity equations are presented which illustrate the effects of Prandtl number, viscosity-temperature variation, mass transfer, wall temperature, pressure gradient, and hypersonic parameter sigma on the structure of the boundary layer and the derivatives of velocity (shear force) and total enthalpy at the wall. The results show that the common boundary-layer simplifications (such as Prandtl number = 1, viscosity proportional to temperature, zero pressure gradient) often lead to numerical errors of 20 to 50 per cent in the predicted heat transfer, skin friction, and displacement thickness. The shear and enthalpy gradient are shown to depend on the form of the viscosity-temperature relation, the Prandtl number, and the hypersonic parameter sigma. Results for high surface mass-injection r rates at the stagnation point indicate that the shear at the wall does not vanish as in the case of a flat plate. (Author)

AD-414 826 Div. 9, 12
(TISTP/MFA) OTS price $1.10

Brown Engineering Co., Huntsville, Ala.
THE CALCULATION OF THE FLOW PROPERTIES AND STANDOFF DISTANCE OF A VEHICLE BASED ON AN IDEAL GAS WITH VARIABLE SPECIFIC HEATS AND REDUCED PRESSURES,
by V. L. Reed. 8 Aug 62, 4p. TN R8
Contract DA01 0090RD1019
Unclassified report

Descriptors: (*Compressible flow, Gases), (*Shock waves, Analysis), Programming (Computers), Temperature, Pressure, Density, Specific heat, Stagnation point, Spacecraft.

The program calculates temperature, pressure, density ratio, reduced pressure, collision frequency, and standoff distance based on an ideal gas solution of the adiabatic steady flow compressible relations. (Author)

AD-414 998 Div. 9
(TISTM/BRW) OTS price $1.60

Institute of Engineering Research, U. of Calif., Berkeley.
SUPPLEMENTARY CYLINDER DRAG DATA FOR TRANSITION FLOW CONDITIONS,
by G. J. Maslach. 1 July 63, 6p. Rept. no. AS63 3
Contract Nonr22245
Unclassified report

Descriptors: (*Cylindrical bodies, Drag), (*Drag, Cylindrical bodies), Model tests, Rods, Gas flow, Supersonic flow, Experimental data.

The experimental results indicate a smooth transition from continuum drag coefficient values to predicted free molecular flow drag coefficients.

Normalization of the measured drag values reveals a marked Mach number dependency. Future experimental programs are indicated, including extension to higher and lower Mach numbers, and a detailed pressure survey of the entire cylinder surface. (Author)

AD-415 109 Div. 9
(TISTM/TCG) OTS price $1.10

Yeshiva U., New York.
INTEGRAL EQUATIONS AND INEQUALITIES IN THE THEORY OF FLUIDS,
by J. L. Lebowitz and J. K. Percus. 1962, 2p.
Grant 62 64
AFOSR 5052 Unclassified report

Descriptors: (*Fluids, Theory), (*Integral equations, Fluids), Distribution theory, Functions, Thermodynamics.

AD-415 140 Div. 9
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF CONSIDERING RELAXATION IN THE PROBLEM OF DIRECTING A FLOW AROUND A CONE,
by V. N. Arkhipov and K. S. Khoroshko.
22 July 63, 8p.
FTD TT63 655 Unclassified report

Trans. from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, Nr. 6, pp. 121-124, 1962.

Descriptors: (*Conical bodies, Relaxation time), (*Supersonic flow, Conical bodies), Thermodynamics, Chemical equilibrium, Partial differential equations, Gases, Mixtures.

AD-415 176 Div. 9
(TISTP/JP) OTS price $3.60

Boeing Scientific Research Labs., Seattle, Wash.
SLENDER, TWO-DIMENSIONAL POWER BODIES HAVING MINIMUM ZERO-LIFT DRAG IN HYPERSONIC FLOW,
by Gary R. Saaris. July 63, 1v. TR76; DI82 0274
Unclassified report

Also available from the author.

Descriptors: (*Slender bodies, Hypersonic characteristics), Lift, Drag, Hypersonic flow, Boundary layer, Separation, Thickness, Moments, Function.

The problem of finding the slender, symmetric, two-dimensional body having minimum zero-lift drag is solved by direct methods. A constant friction coefficient is assumed, and both the Newtonian impact law and the Newton-Busemann law are employed to provide the distribution of pressure coefficients over the body. For the class of power bodies, a generalized optimum condition is found in a determinantal form under the assumption that any two functions of the thickness, the length, the enclosed area, and the moment of inertia of the contour are prescribed. After these constraints are specified explicitly, particular problems are solved; it is found that the exponent of the optimum power body is independent of the friction coefficient if the length is given and depends on it is the length is free. Finally, the solutions of this report are compared with the variational solutions of Refs. 1 and 2 for the Newtonian impact law and for the range of values of the friction parameter for which the variational solution includes only a single subarc. (Author)

AD-415 197 Div. 9, 25
(TISTM/TCG) OTS price $1.10

Ministry of Aviation (Gt. Brit.).
INVESTIGATION OF THE HYDRO-DYNAMIC PROCESSES IN THE PSEUDO-COMBUSTIBLE LAYER OF SOLID PARTICLES UNDER HIGH PRESSURE (Issledovanie Gidrodinamicheskikh Protsessov v Psevdoozhizhennom sloe Tverd'ykh Chastits pod V'vsokim Davleniem),
by O. S. Chekhov, V. N. Anokhin, B. N. Shekun, and R. Z. Khiterer. July 63, 7p.
MOA/TIL Trans. no. T5352 Unclassified report

Trans. from Khim. Prom. USSR, 7, pp. 48-50, 1961.

Descriptors: (*Hydrodynamics, Solids), (*Solids, Combustion), (*Gases, Combustion), Particles, Carbon, Mixtures, Ammonia, Liquids, High-pressure research.

AD-415 369 Div. 9
(TISTP/JP) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
A PROPOSAL FOR THE STUDY OF COLLISIONAL PROCESSES LEADING TO ELECTRONIC EXCITATION AND IONIZATION BEHIND SHOCKWAVES,
by Ernst H. Winkler. Sep 63, 11p. NOLTR63 33; Ballistics research rept. 93
Unclassified report

Descriptors: (*Shock waves, Wakes), (*Gas ionization, Shock waves), (*Research program administration, Shock waves), Excitation, Ionization, Scattering, Reentry vehicles.

It is proposed to utilize alkali metal vapors to study the fundamental collisional processes leading to ionization and electronic excitation in gases behind strong shockwaves. The advantages which result from the substitution of alkali metal vapors for ordinary gases are presented and a suitable arc-heated test facility is described. (Author)

AD-415 409 Div. 9
(TISTP/JP) OTS price $8.10

Aerospace Corp., Los Angeles, Calif.
A REFLECTION METHOD FOR THE CALCULATION OF THE SUBSONIC FLOW REGION ASSOCIATED WITH SMALL ANGLE OF ATTACK BLUNTED AXISYMMETRIC BODIES FOR M INFINITY >> 1,
by C. R. Ortloff. 30 July 63, 79p. Rept. no. TDR169 3230 11TR3
Contract AF04 695 169
SSD TDR63 156 Unclassified report

Descriptors: (*Subsonic flow, Mathematical models), (*Blunt bodies, Subsonic flow), Angle of attack, Matrix algebra, Reflection, Partial differential equations, Supersonic flow, Bodies of revolution, Transformations (Mathematics).

Inviscid flow about a blunted axisymmetric nose at a small angle of attack is treated by the simplified reflection principle of Garabedian, in order to transform the governing equations to a symmetric-hyperbolic system. A stable finite difference scheme is given (and truncation errors presented) whereby a Cauchy problem in the transformed space is derived for the inverse problem considered. In the transformed, higher dimensional space, body and shock are given as constant valued coordinates, which considerably simplifies subsequent numerical and theoretical considerations. A section on Friedrichs' symmetric positive operators is included to illustrate the application of the method to the problem considered. (Author)

AD-415 448 Div. 9, 27
(TISTM/BRW) OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
TRANSPIRATION COOLING OF A TURBULENT BOUNDARY LAYER IN AN AXISSYMMETRIC NOZZLE,
by Joseph Librizzi and Robert J. Cresci. June 63, 49p.
Contract AF33 616 7661, Proj. 7064, Task 7064 01
ARL 63 103 Unclassified report

Descriptors: (*Rocket motor nozzles, Sweat cooling), (*Turbulent boundary layer, Heat transfer), Coolants, Injection, Numerical analysis, Test methods, Turbulence, Gas flow.

An experimental investigation was made of the downstream influence of mass transfer on an exisymmetric nozzle in turbulent flow. The coolant gases (helium and nitrogen) were injected at various rates through a porous region upstream of the throat of the nozzle. The experimental heat transfer to the nozzle surface is presented as a function of the mass transfer for various stations along the impermeable region of the nozzle. An approximate method for predicting the influence of the mass injection on the heat transfer was developed. This method agrees reasonably well with the experimental data for stations sufficiently downstream of the porous region. (Author)

10. FUELS AND COMBUSTION

AD-414 467 Div. 10, 17
(TISTM/REB) OTS price $8.60

Phillips Petroleum Co., Bartlesville, Okla.
GAS TURBINE AND JET ENGINE FUELS.
Summary rept. 1 Apr 62-31 Mar 63,
by W. L. Streets and R. M. Schirmer. Mar 63, 81p.
Research Division Report 3529 63R
Contract N600 19 58219
Unclassified report

Descriptors: (*Gas turbines, Fuels), (*Jet engine fuels, Corrosion), (*Inlet guide vanes, Corrosion), Sulfur, Combustion, Test methods, Sea water, Exhaust gases, Turbojet engines.

The primary effort has been evaluation of the effects of fuel sulfur and ingested sea water on hot gas corrosion of turbine inlet guide vanes using specimens fabricated from five typical current-generation alloys including Udimet 500, Waspalloy, Rene 41, Hastelloy R-235 and Haynes Alloy 25. A second project consisted of a study of test methods for evaluating the burning quality of jet fuels. Twelve-hour duration tests were conducted with the Phillips 2-Inch Research Combustor operated at a pressure of 12 and 2000F exhaust gas temperature showed that: (1) guide vane metal loss is approximately a linear function of time; (2) a fuel sulfur content of 1.0% had no detrimental effect on the rate of metal loss; (3) only Haynes Alloy 25 exhibited significantly more loss in tensile strength with sulfur than without; (4) all alloys suffered marked losses in ductility, though no sulfur effect was indicated; (5) photomicrographs suggested predominantly intergranular attack, which was not increased by the addition of sulfur to the fuel. (Author)

AD-414 650 Div. 10
(TISTM/TLG) OTS price $15.50

Aerospace Corp., Los Angeles, Calif.
THE AEROSPACE CORPORATION COMPUTER PROGRAMS FOR THE SOLUTION OF MULTIELEMENT CHENICAL EQUILIBRIA. VOLUME II. CHEMICAL PROGRAM DESCRIPTION,
by H. J. Vale. 17 July 63, 221p. Rept. no. TDR69 2240 51TR 2
Contracts AF04 695 69 and AF04 695 169
DCAS TDR62 138
Unclassified report

Descriptors: (*Thermodynamics, Mathematical analysis), (*Chemical equilibrium, Programming (Computers)), (*Rocket motors, Chemical equilibrium), (*Flames, Chemical equilibrium), Combustion, Temperature, Pressure, Ionization.

A system of programs was developed to compute complex chemical equilibria. These programs use a general numerical and analytical approach and accept a very flexible problem formulation. The computation capabilities of this system include rocket engine performance, flame composition and temperature determination, Mollier diagram production, and equilibria solution for any prescribed regime of pressure and temperature. Ionic species are considered where requested and when available. (Author)

AD-415 380 Div. 10, 1
(TISTM/TCG) OTS price $3.60

Naval Weapons Evaluation Facility, Albuquerque, N. Mex.
A STUDY OF THE TEMPERATURE DISTRIBUTION WITHIN AIRCRAFT-FUEL FIRES,
by William Gordon and Robert D. McMillan.
1 Aug 63, 30p.
NAVWEPS Rept. 8277 Unclassified report

Descriptors: (*Jet engine fuels, Fires), (Gasoline, Fires), (*Fires, Jet engine fuels), Temperature, Distribution, Combustion, Flames, Time, Burning rate, Aircraft.

A relatively simple picture of the temperature distribution within 100/130-octane aviation gasoline and JP-4 aviation fuel fires is presented. JP-4 aviation fuel burns with a slightly hotter flame temperature than 100/130-octane aviation gasoline. The point of hottest temperature within the fire is in the center between 30 and 50 in. above the surface of the fuel. The interior of the fire is hotter than the edges at all heights 18 in. or greater above the fuel surface. At 6 in. above the fuel surface, the edges of the fire are hotter than the interior. No relationship between the temperature of the fire and the time it has burned was found. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-414 372 Div. 11, 25
(TISTP/WH) OTS price $5.60

SKF Industries Inc., Philadelphia, Pa.
STUDY OF THE VIBRATION CHARACTERISTICS OF

BEARINGS,
Progress rept. no. 6, 1 Feb-31 Mar 61
by Ulrich Rimrott and Olof Gustafsson. Mar 61,
1v. Rept. no. AL61L014,
Contract NObs78552

Unclassified report

Descriptors: (*Bearings, Vibration), (*Vibration, Bearings), Noise, Airborne, Structures, Rotation, Frequency, Acoustic properties.

Airborne noise and structure borne vibrations of 6310 size bearings were investigated on the bearing vibration tester for bearings with 25 to 100 mm bore. The relationships between amplitude and speed and between airborne noise and structure borne vibrations are shown. Structure borne vibrations and airborne noise measured in absolute units, (microinches/second velocity and absolute acoustical decibels of 6305 and 6310 size bearings are compared. The effect of housing mass on bearing frequencies is displayed. A discussion of the results is given. (Author)

12. GUIDED MISSILES

AD-414 106 Div. 12, 27
(TISTA/FRL) OTS price $5.60

Rand Corp., Santa Monica, Calif.
A BRIEF SURVEY OF TRAJECTORY, GUIDANCE, AND PROPULSION ASPECTS OF ORBITAL RENDEZVOUS,
by H. B. Schechter. May 63, 50p. Memo no. RM3275PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Rendezvous spacecraft, Orbital trajectories), Rendezvous trajectories, Velocity, Trajectories, Launching, Flight paths, Parking orbit trajectories, Interception probabilites, Thrust, Guidance.

Aspects of the problem of orbital rendezvous are reported from a survey of the open literature. The papers studied are discussed briefly, and some of the interesting results and data are compared. Most of the papers can be grouped into either of two classes: The first class tackles the problem from the point of view of impulsive Keplerian orbital transfers; the second class analyzes the terminal portion of the rendezvous maneuver, or more specifically, the selection of thrusting and guidance laws required to insure a soft contact between the maneuverable interceptor and the target satellite. The survey pointed out the need for a more general parametric study of the terminal phase of orbital rendezvous; in particular, optimal guidance laws. (Author)

AD-414 132 Div. 12
(TISTA/FRL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THIS IS HOW IT ALL BEGAN,
by I. Merkulov. 17 July 63, 9p.
FTD TT63 612 Unclassified report

Trans. from Znaniye-Sila, no. 9, pp. 4-6, 1962.

Descriptors: (*Rocket propulsion, History), (*Rockets, History).

A short history of rockets and rocket propulsion. (Author)

AD-414 152 Div. 12, 22
(TISTP/AW) OTS price $1.10

Magnavox Co., Urbana, Ill.
SOLID-STATE ARM SAFE DEVICE (PHASE III).
Monthly progress rept. no. 18, 1 June-30 June 63,
by L. W. Ricketts. 5 July 63, 2p.
Contract DA11 022 ORD 4048
Unclassified report

Descriptors: (*Arming devices, Guided missile warheads), Miniature electronic equipment, Switching circuits, Explosive initiators, Solid state physics, Acceleration, Ranges (Distance), Guided missile fuzes.

The purpose of this third phase four-month program is to design, develop and fabricate at least three miniature electronic solid state arm safe devices capable of functioning in various warheads for Army missiles under a wide range of environmental conditions. The first outputs must activate a squib at a preselected acceleration. The second output is to have a solid state switching circuit which will provide an electrical change of state after the missile has traveled a preselected distance from the launch site. (Author)

AD-414 163 Div. 12, 9, 30
(TISTM/BRW) OTS price $4.60

General Technologics Corp., Alexandria, Va.
INSTRUMENTATION STUDY AND ANALYSIS FOR OBSERVATION OF RE-ENTRY PHENOMENA,
by H. M. Childers. July 63, 40p.
Contract AF29 601 5390, Proj. 1831, Task 183103
AFSWC TDR63 58 Unclassified report

Descriptors: (*Reentry vehicles, Atmosphere entry), (*Atmosphere entry, Aerodynamic heating), Temperature, Measurement, Pyrometers, Radiometers, Spectrophotometers, Photography, Instrumentation.

The uses of pyrometry, radiometry, spectrophotometry, and photography for determining the temperature of a re-entering body are analyzed. It is shown that all but the first of these methods can be used to obtain temperature information on re-entering objects that are not ablating. This temperature information is gained fromm measurements on the shape of the thermal emission curve. Methods for handling the ablating case are discussed. The use of photography for identifying tracer flares that are re-entering the earth's atmosphere at high velocities was analyzed and shown to be feasible. How photography, in conjunction with tracer flare re-entry experiments, can be used for establishing the validity of mathematical, re-entry, burn-up models was also analyzed. The various associated difficulties and how they might be overcome are discussed in some detail. (Author)

AD-414 214 Div. 12
(TISTW/RHR) OTS price $4.60

Boeing Co., Seattle, Wash.
SITE ACCEPTANCE TEST PROCEDURES WHITEMAN AFB.
20 May 63, 38p. Rept. no. D2 9262, V. XIII
Contract AF04 694 107
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Air Force), (*Guided missile components, Acceptability), (*Guided missiles, Research program administration), Checkout equipment, Test equipment, Military requirements, Maintenance, Ground support equipment, Quality control, Calibration, Electronics equipment, Power equipment, Test sets, Strategic weapons.

The purpose of this document is to specify the acceptance test required for the checkout of equipment assembled into a MINUTEMAN Missile system at Whiteman AFB preparatory to the eventual acceptance of the Flights, Squadrons and the entire Wing. Procedure documents required for the certification of Assembly and Checkout test equipment as well as the documents required for checkout of OGE and MGE equipment are presented. (Author)

AD-414 380 Div. 12
(TISTW/RHR) OTS price $5.60

Boeing Co., Seattle, Wash.
FLIGHT TEST MISSILE M436 MODEL SPEC. S-133-1007C,

by Carl J. Lisb. 31 July 63, 1v. Document no. D2 10889 1, vol. 53.
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Air force), (*Guided missile components, Acceptability), (*Guided missiles, Research program administration), Specifications, Military requirements, Quality control, Electronic equipment, Tests, Strategic weapons.

AD-414 381 Div. 12
(TISTA/FRL) OTS price $2.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FOR FTM 43 EQUIPMENT COVERED BY THE FOLLOWING MODEL SPECS: S-133-1000-1-4, S-133-1000-1-5, S-133-1000-1-16, S-133-1000-1-17, S-133-1000-1-18, S-133-1000-1-19, S-133-1000-1-20.
by Carl J. Lesh. 31 July 63, 23p. Document no. D2 10889 2, Vol. 53
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Guided missile components), Arming devices, Guided missiles warheads, Specifications.

AD-414 501 Div. 12
(TISTW/RHR) OTS price $1.60

Boeing Co., Seattle, Wash.
FLIGHT TEST MISSILE ESTIMATED MASS DATA (F-180) - BOEING COMPONENTS,
by P. F. Labes. 1 Aug 63, 18p. Rept. no. D2 14787 2
Contract AF04 647 289

Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Air Force), (*Guided missile components, Weight), Instrumentation, Data, Research program administration, Flight testing, Rocket motors, Strategic weapons.

This document has been prepared to serve as a mass data summary of the Boeing Responsibility Hardware in the Minuteman Flight Test Program. It provides the pertinent Estimated (F-180) weight, balance and inertia data, as released officially by the Boeing Minuteman Weight Group. Mass data for Flight Test Missiles 443 thru 445 and Flight Test Missiles 446 thru 448 are presented. (Author)

AD-414 568 Div. 12, 8
(TISTW/RHR) OTS price $2.60

Boeing Co., Seattle, Wash.
RADIO FREQUENCY PLAN FOR MINUTEMAN GROUND ELECTRONIC SYSTEM,
by J. Taylor and L. E. Olson, Jr. 19 Aug 63, 21p. Rept. no. D2 30392 1
Contract AF04 694 266

Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Electronic equipment), (*Guided missile components, Checkout equipment), Ground support equipment, Bandwidth, Military requirements, Operations research, Interference, Test equipment, Strategic weapons, Radiofrequency.

The purpose of this plan is to define the requirements for Radio Frequency requirements for assembly, checkout and operation of the Minuteman Ground Electronic System. (Author)

AD-414 614 Div. 12, 27
(TISTW/RHR) OTS price $2.60

North American Aviation, Inc., Downey, Calif.
THOR PROJECT.
Monthly progress rept. no. 4 for July 63.
19 Aug 63, 20p.
Contract AF04 695 306

Unclassified report

Descriptors: (*Guided missiles (Surface to surface). Experimental data). (*Rocket motors, Malfunctions). Guided missile components, Oscillation, Design, Launching, Specifications, Flight testing, Propulsion, Pressure switches, Booster motors, Launch vehicles (Aerospace).

The Thor project provides technical assistance to all programs utilizing the LR79 engine system. These programs include Delta and Agena. The program differences require constant cognizance of test programs, test plans, engine performance and acceptance history, engine and vehicle configuration, technical manuals and data, AGE utilization and capabilities, malfunctions and component failures, flight performance and abnormalities, for the effect on all programs. This report is the fourth in a series of monthly reports concerning the progress and status of Thor. It pertains to work performed during July 1963. (Author)

AD-414 804 Div. 12
(TISTP/TL) OTS price $5.60

Brown Engineering Co., Huntsville, Ala.
FLARED-CONE PROJECTED AREAS,
by A. R. Phillips. 5 June 62, 46p. TN R3
Contract DA01 0090RD1019

Unclassified report

Descriptors: (*Nose cones, Geometry), (*Reentry vehicles, Nose cones), Flared afterbodies, Design, Numerical analysis, Equations, Trigonometry, Integrals, Geometric forms.

Formulas are presented for the calculation of the projected areas of arbitrary, axially symmetric surface sections for a flared-cone figure. The formulas apply to aspect angles ranging from 0 to 90 degrees, measured from the symmetry axis. Derivations are included. (Author)

AD-414 819 Div. 12, 6
(TISTA/GEC) OTS price $2.60

Brown Engineering Co., Huntsville, Ala.
A MODEL FOR PREDICTION OF THE ELECTROMAGNETIC INTERACTION WITH THE WAKE OF RE-ENTRY BODIES,
by J. E. White, Jr. 15 May 62, 20p. Technical note R25
Contract DA01 0090RD1019

Unclassified report

Descriptors: (*Re-entry vehicles, Wakes), (*Wakes, Radar echo areas), Radar reflections, Electromagnetic wave reflections, Model tests, Nose cones, Cylindrical bodies, Plasma sheaths, Numerical analysis, Laminar boundary layer, Theory, Ions.

The laminar wake of a re-entry vehicle is simulated by a system of cylindrical plasma shells.

The radar cross-section per unit length is found, taking into account the energy losses due to collisions. Numerical results await completion of a computer program. (Author)

AD-414 825 Div. 12, 30
(TISTA/GEC) OTS price $4.60

Brown Engineering Co., Huntsville, Ala.
A FORTRAN PROGRAM TO CALCULATE A BALLISTIC MISSILE TRAJECTORY FROM BURN OUT TO IMPACT,
by Charles F. Ostner. Nov 62, 39p. Rept. no. Technical note R28
Contract DA01 0090RD1068
Unclassified report

Descriptors: (*Guided missile trajectories, Programming (Computers)), Guided missiles (Surface to surface), Descent trajectories, Propellant burn-out, Impact shock, Terminal ballistics.

This computer program computes a ballistic trajectory from burn out or any point thereafter to impact. It assumes point mass and a spherical earth. The program takes into account air resistance, the variation of the gravitational and centrifugal field with altitude, and earth's rotation. It uses a system of coordinates (X, Y, and Z) rigidly connected with the rotating earth. The computer program is written in FORTRAN II and an autocoder deck has been compiled. The program is run on the IBM 1410 computer. It is being adapted for use on the IBM 1620 computer for use by the Army. (Author)

AD-415 027 Div. 12
(TISTA/FRL) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
CHARACTERISTIC VELOCITY LOSSES ASSOCIATED WITH NONZERO BURNING TIME MANEUVERS,
by P. T. Guttman. 22 July 63, 17p. Rept. no. TDR169 3550 01TN3
Contract AF04 695 169
SSD TDR63 175 Unclassified report

Descriptors: (*Spacecraft, Maneuverability), Feasibility studies, Thrust, Weight, Specific impulse, Acceleration, Velocity, Trajectories, Orbital trajectories.

Characteristic velocity requirements associated with nonzero burning time maneuvers are investigated for vehicles having initial thrust-to-weight ratios between 0.1 and 1.0, and specific impulses of 340, 460, and 850 seconds. Results are presented of comparisons of the characteristic velocity requirements of the finite thrust vehicles with the impulsive thrust requirements for equal missions. Three missions are considered: (1) Plane-change maneuvers. (2) In-plane altitude transfer with no circularization at apogee. (3) In-plane altitude transfer with circularization at apogee. It is assumed that the maneuvers are performed with application of constant thrust magnitude. (Author)

AD-415 036 Div. 12, 30
(TISTM/BRW) OTS price $1.10

Mitre Corp., Bedford, Mass.
A COMPUTER PROGRAM FOR DETERMINING THE RADAR CO-ORDINATES OF A BALLISTIC MISSILE,
by V. A. DiDio. Aug 63, 3p. Rept. no. W5329
Contract AF33 600 39852, Proj. 602
ESD TDR63 163
Unclassified report

Descriptors: (*Guided missile trajectories, Radar tracking), (*Computers, Programming (Computers)), Programming languages, Position finding, Velocity.

There is a continuing need for computer programs that will determine the position and velocity coordinates of ballistic trajectories as they intersect a radar beam. A program written at MITRE has had much use, resulting in requests for alterations to suit various users' needs. This program, known as 419EM, has been altered and is described here as it is in its current form.

AD-415 047 Div. 12, 30
(TISTA/VGW) OTS price $8.60

Aeronutronic, Newport Beach, Calif.
INITIAL ORBIT DETERMINATION OF EARTH SATELLITES FROM ANGULAR OBSERVATIONS,
by Paul E. Koskela and Joanne B. Kloepfer.
July 63, 90p. Pub. no. U2194
Contract AF19 628 562
ESD TDR63 426 Unclassified report

Descriptors: (*Orbital trajectories, Mathematical analysis), (*Satellites (Artificial), Orbital trajectories), Programming (Computers), Circular orbits trajectories, Celestial mechanics, Digital computers, Data processing systems.

A computer program is described for the computation of initial orbits of Earth satellites determined from a minimum number of topocentric angular observations within one revolution. The first approximation may subsequently be improved with additional observations by means of a differential correction process. (Author)

AD-415 064 Div. 12, 26
(TISTW/RHR) OTS price $6.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FLIGHT TEST MISSILE 438, MODEL SPECIFICATION S-133-1007C,
by Carl J. Lish. Aug 63, 1v. Rept. no. D2 10889 1, Vol. 55
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Procurement), (*Guided missile components, Quality control), Acceptability, Specifications, Military requirements, Instrumentation, Damage, Installation, Electronic equipment, Strategic weapons.

AD-415 065 Div. 12
(TISTP/AW) OTS price $2.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FOR FTM 438 EQUIPMENT,
by Carl J. Lish. 8 Aug 63, 23p. D2 10889 2, Vol. 55
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Quality control), Arming devices, Explosive actuators, Acceptability.

AD-415 159 Div. 12
(TISTA/MD) OTS price $5.60

Aerospace Communications and Controls, Div. Radio Corp. of America, Burlington, Mass.
PROGRAM 706. TASK 3. LINEAR SHAPED CHARGE SEPARATION TESTS.
Quarterly progress rept. no. 2,
by S. J. Engel and R. R. Batchelder. 20 July 63, 1v.
Contract AF04 695 273
SSD TDR63 183, Vol. 3 Unclassified report

Descriptors: (*Shaped charges, Separation), (*Space vehicles, Separation), Staging, Tests, Test methods, Instrumentation, Shock waves, Vibration, Deflection, Temperature, Shock (Mechanics), Aerodynamic heating, Simulation, Test equipment, X-ray photography.

Studies and laboratory test are made of a flexible linear shaped charge (FLSC) system for space vehicle stage separation is presented. Three separation tests are described, including preliminary results of these tests. The success of the tests demonstrate that the separation system design is functionally acceptable. The magnitude of the measured shock response decreased with distance from the separation plane. Minimum correlation was obtained from gross impulse calculations, as expected. X-ray photography of the shaped charge proved useful. (Author)

AD-415 160 Div. 12, 14, 27
(TISTM/BRW) OTS price $4.60

Aerospace Communications and Controls, Div Radio Corp. of America, Burlington, Mass.
PROGRAM 706 TASK 4. MPU BLADDER DEVELOPMENT.
Quarterly progress rept. no. 2, 1 Apr-30 June 63. 20 July 63, 35p.
SSD TDR63 183 Unclassified report

Descriptors: (*Rocket motors (Liquid propellants), Liquid rocket propellants), (*Propellant tanks, Inflatable structures), (*Inflatable structures, Materials), Halocarbon plastics, Tests, Temperature, Test methods, Hydrazine, Hydrazine (Derivatives), Nitrogen compounds, Oxygen compounds, Oxides.

Effort was directed to develop a non-metallic positive expulsion bladder to be used in space vehicle propulsion systems, utilizing N2O4 and a 50/50 blend of UDMH and N2O4 as the propellants. Research and tests on materials for non-metallic positive expulsion bladders have resulted in the selection of a ''bag-in-bag'' Teflon film combination in each bag, for fabrication of a set of 37-in. diameter bladders to be subjected to a series of expulsion/temperature tests. Full scale bladder tests have shown that both a ''bag-in-bag'' single layer Teflon film combination and a single ''bag-in-bag'' Teflon film combination fail during propellant expulsion tests below 70 F. (Author)

AD-415 288 Div. 12, 25
(TISTP/MFA) OTS price $1.00

Air Force Aero-Propulsion Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
MICROWAVE AND LASER TECHNIQUES AS FLIGHT VEHICLE POWER TRANSMISSION SUBSYSTEMS.
Final rept., Sep 62-May 63,
by James D. Reams. July 63, 27p.
Proj. 8128, Task 812805
ASD TDR63 517 Unclassified report

Descriptors: (*Spacecraft, Power), (*Lasers, Analysis), Microwaves, Microwave equipment, Reflectors, Design, Photons, Absorption, Emissivity, Atomic energy levels, Diffraction, Silicon, Gallium compounds, Arsenides, Kerr cells.

This report contains the results of an in-house exploratory investigation of the feasibility of using microwave techniques and lasers for transmitting flight vehicle power between two points in space. This investigation consisted of analyzing both microwaves and lasers as power subsystem concepts. The concepts were then compared and each was contrasted with a more conventional self-contained power subsystem. Microwave techniques are not practical for flight vehicle power subsystems. The over-all efficiency of lasers must be improved by approximately two orders of magnitude and the cooling requirements drastically reduced before lasers begin to be attractive as a flight vehicle power subsystem concept. (Author)

AD-415 401 Div. 12, 27
(TISTA/FRL) OTS price $5.60

Rocketdyne, Canoga Park, Calif.
INVESTIGATION OF ATLAS F-SERIES FLAME DEFLECTOR PRESSURE PULSE.
15 Aug 63, 54p. R5304
Contract AF04 694 328
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Flame deflectors), Pressure, Tests, Instrumentation, Guided missile launchers, Heat shields, Thrust, Temperature, Booster motors.

Presented are the results of a test program to determine the effects of the pressure pulse that is generated in the flame deflector during initial thrust buildup of the Atlas MA-3 booster engine. (Author)

AD-415 431 Div. 12, 7
(TISTA/FRL) OTS price $1.75

Lockheed Aircraft Corp., Sunnyvale, Calif.
FLAT PLATE SOLAR THERMOELECTRIC GENERATOR ORBITAL EXPERIMENT,
by E. L. Brady and A. N. Himle. May 63, 57p.
Contract AF04 647 673, Proj. 8173, Task 817302 12
ASD TDR63 479 Unclassified report

Descriptors: (*Generators, Thermoelectricity), (*Generators, Solar radiation), Launch vehicles (Aerospace), Satellites (Artificial), Polar orbit trajectories.

The flat plate Solar thermoelectric generator orbital experiment was performed to obtain data on flat plate generator panels functioning in an actual space environment and to correlate these data with laboratory data. These data extend the state-of-the-art and define the problem areas of the concept development and evaluation techniques. Two orbital experiments were performed on Agena satellite systems in polar orbit. In each experiment, three thermoelectric generator panels were extended from the vehicle on an erecting oriented boom to approximate the environment of an actual generator array. Two of the six orbited panels produced about 85 percent of laboratory-measured performance with no measured deterioration during the 39 orbits when data were available. The three panels flown in

the first flight had lower performance and showed decreased performance as a function of time. The Solar intensity measurement variations were greater than anticipated. (Author)

AD-415 432 Div. 12, 13, 23
(TISTE/OHD) OTS price $1.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN),
by G. W. Greene. 30 Aug 63, 11p. Rept. no.
MPO SR17 100
Contract AF04 694 261
Unclassified report

Descriptors: (*Launching sites, Construction), (*Military facilities, Ground support equipment), Buildings, Electrical equipment, Mechanical engineering, Design.

This initial issue of the Facilities Design Criteria, Launch Control Center Training Building, Vandenberg Air Force base presents the information required by the Architect-Engineer for preliminary design. As the trainer design progresses, this criteria will be adjusted and expanded. In its final form this document will contain all criteria required for designing the WS133B addition to the WS133A LCC Training Building. (Author)

AD-415 439 Div. 12
(TISTP/RD) OTS price $11.00

Boeing Co., Seattle, Wash.
FIGURE A NO./MRCN ITEM NAMES.
1 July 63, 1v. Rept. no. D2 14191
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface to surface), Guided missile components).

13. INSTALLATIONS AND CONSTRUCTION

AD-414 973 Div. 13
(TISTM/AMS) OTS price $6.60

Institute of Research, Lehigh U., Bethlehem, Pa.
INELASTIC LATERAL-TORSIONAL BUCKLING OF BEAM-COLUMNS,
by Theodore V. Galambos and Yuhski Fukumoto.
Aug 63, 64p. Rept. no. 205A
Unclassified report

Descriptors: (*Beams (Structural), Buckling (Mechanics)), Loading (Mechanics), Mechanics, Steel, Stresses, Equations, Mathematical analysis, Data, Differential equations, Computers.

In this report a method is presented for the determination of the inelastic lateral-torsional buckling strength of as-rolled steel wide-flange beam-columns. The beam-columns are subjected to an axial force and to bending moments applied at one end only. The end-moments cause bending about the strong axis of the members, and the effects of initial residual stresses are included in the analysis. The solutions are obtained on the basis of a finite difference approximation of the differential equations with variable coefficients, the resulting characteristic determinant being solved numerically by a digital computer. (Author)

AD-414 978 Div. 13
(TISTE/CAM) OTS price $1.10

Foreign Tech., Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTRO-FILTER TYPE EF-2.
16 July 63, 2p.
FTD TT63 639 Unclassified report

Trans. from Vystavki Lostizhenii Narodnogo Khozyzystva, SSSR, Atomizdat, 25:6, 1p. 1960.

Descriptors: (*Air conditioning equipment, Atmospheric pollution), Alpha particles, Beta particles, Aerosols.

AD-414 995 Div. 13
(TISTM/AM) OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
SNOW STABILIZATION FOR ROADS AND RUNWAYS,
by Albert F. Wuori. Jan 63, 20p.
CRREL Technical rept. no. 83
Unclassified report

Descriptors: (*Snow, Stabilization), (*Runways, Construction), Roads, Tests, Test equipment, Landing fields, Aging (Materials), Hardening, Data, Soil mechanics.

A study of methods of stabilizing snow for roads and runways was conducted on the Greenland Ice Cap during the summer of 1959. Ten test lanes were constructed to determine the effect of various machine speeds, cutting, and compaction techniques; 7 lanes were dry-processes, 3 lanes dry- and heat-processed. The dry-processing methods included use of Snowblast and Peter miller rotary plows followed by leveling and compaction with a D-8 low ground pressure tractor. A T-5 Snow Packer was used in the heat-processing tests. Tests showed that dry processing produced a pavement structure capable of supporting certain types of wheeled cargo aircraft after 3 weeks of age hardening. Apparently heat processing of a thin surface layer is required to support aircraft with tire pressures exceeding 100 psi. (Author)

AD-415 081 Div. 13
(TISTM/AM) OTS price $1.60

Illinois Inst. of Tech., Chicago.
ON SOME MISCONCEPTIONS IN THE DIRECT DESIGN OF STRUCTURES,
by George J. Megarefs and Anthony J. Lacopulos.
July 63, 13p. DOMIIT Rept. no. 1-25
Contract Nonr140604, Proj. NR064 429
Unclassified report

Descriptors: (*Structures, Design), Structural properties, Mechanics, Analysis, Beams (Structural), Stresses, Sheets, Equations.

In the absence of a direct method of minimum-weight design for two-dimensional structures, the concept of ''equal-strength design'' has frequently been used in the past. According to this concept, a structure is designed so that the two principal stresses (or principal moments in the case of bending) are equal at each point. In many problems the equal strength design is the same as the minimum-weight design, but it is erroneous to assume, as has been done in at least one recent paper that the two criteria are synonymous. Ther present paper presents two elementary counter examples to the above false proposition. For a clamped circular plate under

a ring load a design is found which is of lower weight than that of the equal-strength design, and for a simply supported annular plate under a ring load on its inner edge it is shown that no equal-strength design exists. Some general conclusions regarding direct minimum-weight design of plates are then presented. In particular it is shown by example that if weight is determined by a single design parameter, the resulting function may have minimum which is non-analytic and points of zero first variation which are not minima. (Author)

AD-415 425 Div. 13, 2
(TISTE/JBM) OTS price $5.60

Bureau of Reclamation, Denver, Colo.
STUDIES OF TRACTIVE FORCES OF COHESIVE SOILS IN EARTH CANALS,
by E. J. Carlson and P. F. Enger. 19 Oct 62, 1v.
Laboratory rept. no. Hyd504
Unclassified report

Presented at the Eleventh Hydraulics Division Conference, American Society of Civil Engineers, Aug 15-17, 1962, Davis, California.

Descriptors: (*Inland waterways, Design), (*Soil mechanics, Inland waterways), Construction, Friction, Soils, Plasticity, Shear stresses, Erosion, Probability, Density, Tests, Experimental data, Tables, Test methods.

A field and laboratory study was made to develop a method for determining critical tractive forces of cohesive earth materials for the design of unlined and earth-lined canals. It is desirable to know the critical tractive force value of proposed earth canal materials and to use critical tractive force as a criterion in designing earth canals. Critical tractive force is a more precise value on which to base the design than estimated permissible canal velocities. When the critical tractive force value is known, the methods of design outlined in the references presented can be used to give the most efficient design for the canal. Soil samples were obtained from 46 test reaches in various sizes of canals and laterals constructed on Bureau projects. Soil and hydraulic tractive force properties were measured and computed in the laboratory. The properties measured or computed were: critical tractive force from the hydraulic erosion machine, liquid limit, plasticity index, soil density, percent of maximum Proctor density, shrinkage limit, soil gradation using the logarithmic probability method of analysis and unit vane shear values. (Author)

AD-415 453 Div. 13
(TISTE/OHD) OTS price $15.50

Little, Arthur D., Inc., Cambridge, Mass.
DEVELOPMENT OF A MINIATURIZED REFRIGERATOR FOR SPACE APPLICATIONS.
1963, 219p.
Contract AF04 695 144, Proj. 5043, Task 504323A
SSD TDR63 243 Unclassified report

Descriptors: (*Refrigerant compressors, Spacecraft), (*Refrigeration systems, Infrared detectors), Gas bearings, Thermodynamics, Gas leaks, Heat exchangers, Thermal insulation, Pistons, Springs, Mechanical engineering, Electrical equipment, Test methods, Test equipment, Instrumentation, Reliability, Mechanics, Dynamics, Design, Theory.

The primary objectives of this program are to demonstrate an experimental reciprocating cooling device with the following characteristics: Ultimate life of three years continuous, unattended operation in a satellite environment with an internal temperature variable from 273 to 300 deg. K. Cooling capacity of 2 watts at a temperature of 77 ± 7 deg. K, measured at the cold fluid terminals of the refrigerator, with maximum power input of 100 watts of electric power. Volume not in excess of 610 cubic inches, length not in excess of 24 inches, diameter not in excess of 8 inches, and weight not in excess of 15 pounds. Ability to cool infrared detector arrays and tubes without significantly degrading their noise characteristics from those realized by immersing them in liquid nitrogen at atmospheric pressure. Adaptability to space radiators for the rejection of internally generated heat. Further, the technology developed in this program is to be applicable to future coolers for operation at temperatures as low as 4.2 deg. K or at other temperatures intermediate between 77 and 4.2 deg. K. (Author)

14. MATERIALS (NON-METALLIC)

AD-414 137 Div. 14, 32
(TISTM/ODN) OTS price $14.50

Air Force Materials Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
AN INDEX TO NON METALLICS R&D PROGRAMS OF TEN AEROSPACE COMPANIES.
9 May 63, 213p.
Task 738103
ASRCE TM62 24 S1 Unclassified report

Descriptors: (*Abstracts, Materials), (*Materials, Indexes), (*Indexes, Materials), Information retrieval, Adhesives, Adhesive tapes, Catalysts, Ceramic materials, Textiles, Coatings, Elastomers, Expanded plastics, Fuels, Thermal insulation, Plastics, Metals, Embedding substances, Sealing compounds, Physical properties, Mechanical properties.

This index is a follow-on to the index presented in ASRCE TM-62-24, and covers 167 annotated abstracts describing non-metallics R&D programs being conducted by ten aerospace companies. All of the programs described are recent and many of them are still in progress. Over 300 materials are reported. The abstracts presented were submitted by the following companies as a partial requirement of various data compilation contracts sponsored by the Information Processing Section of the Materials Applications Division: Bell Aerosystems, The Boeing Company (All Divisions), Chance Vought (Aeronautics), General Dynamics (Convair/Fort Worth), General Dynamics (Astronautics), McDonnell Aircraft, North American Aviation, The Northrop Corp. (Norair), Republic Aviation, and Solar Aircraft. (Author)

AD-414 156 Div. 14, 30
(TISTM/REB) OTS price $1.25

Monsanto Research Corp., Dayton, Ohio.
ANALYSIS OF THERMAL DEGRADATION OF GLASS REINFORCED PHENOLIC AND EPOXY LAMINATES.
Final rept. Nov 61-July 62,
by Harry S. Wilson, Ival O. Salyer and J. E. Katon. July 63, 40p.
Contract AF33 616 8465, Proj. 7360, Task 736005
ASD TDR62 939 Unclassified report

Descriptors: (*Polymers, Test methods), (*High temperature research, Test methods), (*Laminates, Pyrolysis), (*Laminated plastics,

Pyrolysis), (*Laminated glass, Pyrolysis), Gravimetric analysis, Epoxy plastics, Reaction kinetics, Phenolic plastics, Silicone plastics.

Thermogravimetric analyses were made on Resinox SC-1008 silicone modified phenolic resin and 75% glass laminate and compared with similar samples of Epon 828 epoxy resin. The effects of atmosphere, sample geometry, inclusion of sized glass fabric, and instrument variables on the degradation kinetics of these materials were investigated. Kinetic constants were calculated for the materials from thermogravimetric analysis results and an empirical method of kinetic calculations is discussed. The thermal endurance limit of Resinox glass laminate was also calculated. Differential thermal analyses were carried out on Resinox and Epon laminates and theoretical kinetic relationships were used to facilitate their interpretation. (Author)

AD-414 173 Div. 14, 17, 12
(TISTM/AMS) OTS price $1.10

Air Force Materials Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
THERMOPHYSICAL PROPERTIES OF SOME CANDIDATE SUPERORBITAL HEAT SHIELD AND INSULATION MATERIALS,
by John H. Charlesworth. 6 June 63, 2p.
Task 738103
ASD ASRCE TM63 16 Unclassified report

Descriptors: (*Heat shields, Materials), (*Reentry vehicles, Heat shields), Physical properties, Borides, Emissivity, Graphite, Carbon, Pyrolytic graphite, Niobium, Tantalum, Chromium, Molybdenum, Tungsten, Vanadium, Stainless steel, Aluminum compounds, Oxides, Beryllium compounds, Thermal conductivity, Nitrides, Calcium compounds, Cerium compounds, Dysporosium compounds, Europium compounds, Gadolinium compounds, Lathanum compounds, Samarium compounds, Magnesium compounds, Molybdenum compounds, Silicides, Hafnium compounds, Thorium compounds, Ceramic materials, Carbides.

AD-414 179 Div. 14
(TISTM/AMS) OTS price $8.60

Aerojet-General Corp., Azusa, Calif.
DEVELOPMENT OF IMPROVED HIGH-STRENGTH PREIMPREGNATED MATERIALS FOR FILAMENT WINDING.
June 63, 32p. Rept. no. 2577
Contract NOw 61 0642
Unclassified report

Descriptors: (*Glass textiles, Manufacturing methods), Filament wound construction, Tensile properties, Mechanical properties, Impregnation, Plastics, Extrusion, Filaments, Material forming, Moisture, Experimental data, Physical properties, Viscosity, Controlled atmospheres, Gels, Aging (Materials), Vinyl plastics, Shear stresses, Fibers.

This program was a study of the processes used in the manufacture of 20-end ECG fibrous-glass roving and preimpregnated roving made from it. The program was composed of two independent phases. Phase I was a critical analysis of the various steps involved in the manufacture of glass roving from the point of drawing glass filaments to packaging and shipment of the product. The purpose was to establish optimum procedures which would lead to a retention of a greater proportion of the fiber's virgin strength. Test results for eight experimental lots of roving produced for this study are presented. Phase II was a prepreg manufacturing process variable study. The purpose of this study was to obtain a clearer and more quantitative understanding of the effects of preimpregnation manufacturing parameters on the properties of prepreg roving. Sixteen experimental runs were made to investigate seven process variables, and two runs were made to improve and control resin content in prepregs by application of specially designed devices. Inspection test data for all these material lots are presented, as well as specific process conditions used to produce these lots. (Author)

AD-414 181 Div. 14
(TISTM/TCG) OTS price $1.60

Bendix Products Div., Bendix Corp., South Bend, Ind.
STRENGTHENING OF CHROMIUM-MAGNESIA COMPOSITES.
Interim rept. no. 3, 1 June-31 July 63,
by G. C. Reed. 23 Aug 63, 13p.
Contract N600 19 59647
Unclassified report

Descriptors: (*Composite materials, Ductility), (*Chromium, Composite materials), Ceramic materials, Magnesium compounds, Oxides, Tensile properties, Microstructure, Manufacturing methods, Extrusion, Density, Transition temperature, Oxidation, Sintering.

This report describes the work accomplished during the third bimonthly period of a program ultimately aimed at strengthening chromium-ceramic composites. The initial effort has been directed toward optimizing ductility prior to investigating alloy additions for strengthening. In the previous reporting period, it was found that reducing the MgO content to 3% from the 6% level used in production chrome-30 material increased the tensile elongation almost twofold. Further studies of variations in MgO content are reported herein. These investigations have shown 2% MgO to be the optimum ceramic level from the standpoint of strength and ductility. The oxidation resistance of the composites containing various amounts of MgO was evaluated at 2200F and appeared to be independent of the MgO contents studied. The tensile transition temperature of the extruded material containing 2% MgO was found to be approximately 35F. The effects of annealing at 2500F were also briefly investigated. (Author)

AD-414 348 Div. 14, 17, 26
(TISTM/BRW) OTS price $3.60

Frankford Arsenal, Philadelphia, Pa.
PROPERTIES AND WORKING CHARACTERISTICS OF CAST CELLULAR AND COMPOSITE MATERIALS,
by L. Polonsky and S. Lipson. Feb 63, 35p.
Proj. 5B93 32 008
FA Report R1668
Unclassified report

Descriptors: (*Composite materials, Porous materials), (*Porous materials, Impregnation), (*Metals, Casting), Aluminum, Aluminum alloys, Sodium compounds, Chlorides, Lead, Tin, Zinc, Copper alloys, Hot working, Forge presses, Compressive properties, Density, Ceramic materials, Graphite, Microstructure, Extrusion, Forging, Filters (Fluid), Heat exchangers, Wire, Lead alloys, Antimony alloys.

A study was conducted to: (1) produce a variety of nonferrous cellular and composite materials; (2) subject certain composite materials to swaging, forging, and extrusion; (3) determine certain physical and mechanical properties of these materials; and (4) predict the characteristics of untried composite systems from these properties. This study was exploratory in nature and

involved, for the most part, simple combinations of pure metals. The properties of the component phases of the systems studied were determined in the cellular and solid form. The properties of the cast composites showed that, where the difference between the strength of the component phases was not excessive (the stronger phase being no more than four times stronger than the weaker), the properties of the composite system could be predicted on the basis of a knowledge of the characteristics of the component phases. (Author)

AD-414 353 Div. 14, 25
(TISTP/MFA) OTS price $9.60

Clevite corp., Cleveland, Ohio.
FAILURE MECHANISMS IN CERAMIC DIELECTRICS.
Final rept. 1 Sep 62-30 Apr 63,
by Don A. Berlincourt. 30 Apr 63, 112p.
Contract AF30 602 2594, Proj. 5519, Task 45155
RADC TDR63 269
Unclassified report

Descriptors: (*Ceramic materials, Failure (Mechanics)), (*Dielectrics, Analysis), Dielectric properties, Capacitors, Stresses, Ferroelectric crystals, Barium compounds, Titanates, Zirconates, Oxides, Lead compounds, Titanium compounds, Strontium compounds, Niobium compounds, Carbonates, Scandium compounds, Resistance (Electrical), Electric fields, Temperature , Measurement, Grain structures (Metallurgy).

With the objective of developing an empirical approach to factors influencing failure in ceramics of high dielectric constant (greater than ~ 200), a number of perovskite (ABO_3) dielectrics were prepared and studied. Small substitutions of Nb^{5+} for the B^{4+} ion (Ti^{4+}) and of Sc^{3+} for the A^{2+} ion (Pb^{2+}, Ba^{2+}, Sr^{2+}) were made. Nb^{5+} and Sc^{3+} thus act respectively as electron donor and acceptor. It was demonstrated that the zirconates, as a class, are far superior to the titanates with respect to long term degradation, which is probable best ascribed to electrolysis of oxygen. This can proceed more rapidly with the titanates, since Ti^{4+} is much more readily reduced than is Zr^{4+}. In general, also, the zirconates have higher volume resistivities than the titanates, but there is no clear-cut difference in dielectric strength. Degradation in dielectrics with p-type conduction, which was found to be the usual case, is generally inhibited by donor doping. (Author)

AD-414 415 Div. 14, 25
(TISTM/ODN) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
THE COMPRESSIBILITY OF PYROLYTIC GRAPHITE,
by N. L. Coleburn. 22 May 63, 20p.
NOLTR 63 73 Unclassified report

Descriptors: (*Pyrolytic graphite, Compressive properties), Shock waves, Crystals, High-pressure research, Shock (Mechanics), Velocity, Sound, Data, High-temperature research, Equations, Tables.

The compressibility of pyrolytic graphite was dynamically measured at pressures up to 0.5 megabar by utilizing explosive-generated shock waves. Shock and free-surface velocities normal and parallel to the original plane of graphite deposition were measured optically. The Rankine-Hugoniot shock wave equations were used to determine the compression points corresponding to the measured velocities. The measurements failed to distinguish statistically between the two major crystal directions in regard to dynamic compressibility characteristics. The measured pressure-volume data for pyrolytic graphite and the results of Alder and Christian on natural graphite differ significantly at pressures above 100 kilobars. Within the range of the present experiments no transition of pyrolytic graphite to diamond was found. (Author)

AD-414 504 Div. 14, 25
(TISTM/BRW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE CHANGE IN THE MAGNETIC PROPERTIES OF SOLID INORGANIC COMPOUNDS IN A FIELD OF INTENSE GAMMA-RADIATION,
by S. V. Starodubtsev and I. M. Blaunshteyn.
19 June 63, 10p.
FTD TT63 424 Unclassified report

Descriptors: (*Solids, Inorganic compounds), (*Magnetic materials, Gamma rays), (*Gamma rays, Magnetic properties), (*Inorganic compounds, Magnetic properties), Semiconductors, Quartz, Aluminum compounds, Magnesium compounds, Oxides, Silicon compounds, Paramagnetic materials, Antiferromagnetism.

AD-414 515 Div. 14
(TISTM/BRW) OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
CEMENTITIOUS CERAMIC MATERIALS,
by Ronald T. Hillhouse. Aug 63, 21p.
Proj. 1A013001A039
PA Technical memo. no. 1204
Unclassified report

Descriptors: (*Ceramic materials, Adhesives), (*Adhesives, Ceramic materials), Cements, Bonding, Phosphates, Nitrates, Sulfates, Silicates, Aluminates, Electric insulation, Thermal insulation, Chemical bonds.

A brief study of the chemistry of cementitious, or air setting, ceramic materials for protective coating and potting applications is presented. Included are the three main types of bonding mechanisms -- reaction, precipitation, and hydraulic. Fillers which can be incorporated into the compound, as well as other physical and chemical characteristics of the materials, are considered. There are commercially available materials which are useful to about 3000 F. These compounds, which utilize different types of bonding with various fillers, are discussed and compared. (Author)

AD-414 766 Div. 14
(TISTM/TCG) OTS price $1.10

Massachusetts Inst. of Tech., Cambridge.
STUDY OF THE MOLECULAR STRESS RESPONSE OF SOLID POLYMERS BY PHOTOELASTIC METHODS.
Quarterly progress rept. no. 2, 1 Oct-31 Dec 60,
by R. D. Andrews, Jr. 23 Aug 62, 5p.
Contract DA19 020ORD5213, Proj. TB4 002
Unclassified report

Descriptors: (*Polymers, Stresses), (*Plastics, Mechanical properties), (*Acrylic resins, Stresses), Optical properties, Elasticity, Molecular weight, Humidity, Photoelasticity, Test equipment, Cryogenics.

Division 14 - MATERIALS (NON-METALLIC)

AD-414 799 Div. 14, 25
(TISTM/ODN) OTS price $2.50

Electronics Research Lab., U. of Calif., Berkeley.
THREE-LEVEL MASER MATERIALS: A SURVEY OF POTENTIAL MATERIALS, II,
by J. Wakabayashi. 1 June 62, 107p. Rept. no. Series no. 60, Issue no. 452.
Contract AF49 638 102
Unclassified report

Descriptors: (*Masers, Materials), (*Calcium compounds, Carbonates), (*Barium compounds, Sulfates), Microwave frequency, Paramagnetic resonance, Measurement, Relaxation time, Crystal structure, Theory, Quantum mechanics, Impurities, Microwave spectroscopy, Crystals, Ions, Iron compounds, Chromium compounds.

Paramagnetic resonance of impurities in natural crystals of calcite ($CaCO_3$) and barite ($BaSO_4$) were investigated. Observed spectra are compared with the theoretical spectra of probable impurities. One spectrum in calcite is identified with Fe(3+). Another is possible due to Cr(3+). No identifiable spectrum was observed in barite. (Author)

AD-414 845 Div. 14
(TISTM/TCG) OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
EFFECTS OF TEMPERATURE, STRAIN RATE, AND SWELLING ON THE STRESS-STRAIN PROPERTIES OF ETHYLENE-PROPYLENE GUM VULCANIZATES OF VARYING CROSS-LINK DENSITY,
by T. J. Dudek. 12 Aug 63, 32p. Rept. no. TDR169 3240 22TN2
Contract AF04 695 169
SSD TDR63 176 Unclassified report

Descriptors: (*Synthetic rubber, Stresses), (*Vulcanizates, Stresses), (*Organic compounds, Vulcanizates), Elastomers, Polyethylene plastics, Temperature, Density, Thermal stresses, Elasticity, Hysteresis, Failure (Mechanics), Test methods.

The stress-strain properties and ultimate properties of EPR vulcanizates of varying cross-link density (swollen and unswollen) were determined at two temperatures and two strain rates. A swell-deswell technique was employed to obtain equilibrium results at low volume fraction of rubber. The Mooney-Rivlin constants were found to depend on temperature, strain rate, and cross-link density. The network structural parameters obtained from swollen stress-strain curves were always greater than values obtained from the Mooney-Rivlin constants. Thermoelastic measurements showed that EPR undergoes a larger negative internal energy change on extension due to rotational energy levels within chains than polyethyene. A plot of the ultimate properties described a curve which was nearly independent of test conditions. The EPR curve was shifted in the direction of higher elongations. (Author)

AD-414 846 Div. 14
(TISTM/REB) OTS price $4.60

Electronic Properties Information Center, Culver City, Calif.
POLYETHYLENE TEREPHTHALATE DATA SHEETS,
by John T. Milek. June 62, 39p. Rept. no. DS105
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Polyester plastics, Data), (*Electric insulation, Polyester plastics), Electrical properties, Dielectric properties, Surface properties, Volume Resistance (Electrical).

AD-414 908 Div. 14, 7, 21
(TISTM/AMS) OTS price $8.10

Westinghouse Electric Corp., Lima, Ohio.
AEROSPACE ELECTRICAL DIVISION, ALKALI METAL RESISTANT WIRE.
Quarterly progress rept. no. 2, 15 May-15 Aug 63, by E. S. Bober, W. H. Snavely, and R. E. Stapleton. 15 Aug 63, 74p.
Contract AF33 657 10701, Proj. 8128, Task 812808
Unclassified report

Descriptors: (*Electric wire, Corrosion inhibition), (*Corrosion inhibition, Electrical wires), (*Liquid metals, Corrosion), Alkali metals, Microstructure, Seals (Stoppers), Coatings, Design, Potassium, Mercury, Vapors, Tests, Exposure, Aluminum compounds, Oxides, Magnesium compounds, Boron compounds, Nitrides, Beryllium compounds, Stainless steel, Copper, Cladding, Zirconium compounds, Density, Porosity, Electric insulation, Nickel, Plating, Cesium.

The program is directed toward the development of an insulated electrical conductor resistant to saturated potassium (850 C) and mercury (538 C) vapors. Some forty-seven exposure tests were initiated during the period and the test results indicated high purity alumina, magnesia, boron nitride, aluminum nitride and beryllia as well as Oxalloy 28, a stainless steel clad copper core conductor, were resistant to both environments. The fusion coating technique is the only coating process by which coated wire samples for metal vapor corrosion testing have been produced to date. In the initial screening tests, one potting compound, containing zirconia and alumina, was promising enough to merit further testing. Initial test results from trials to densify porous coatings by mass transport of material were very promising. (Author)

AD-414 910 Div. 14
(TISTM/ODN) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METAL-POLYMERIC FILMS ON FRICTION SURFACES OF DETAILS,
by M. L. Barabash, M. V. Korogodskiy and A. S. Krayushkin. 2 July 63, 10p.
FTD TT63 564 Unclassified report

Trans. from Plastmassy V. Mashinostroyenii i Priborostroyenii, Gostekhizdat, Kiev, pp. 359-366, 1961.

Descriptors: (*Films, Friction), (*Friction, Films), Plastic coatings, Lubrication, Surfaces, Colloids, Metals, Polymers.

AD-414 932 Div. 14, 25
(TISTM/ODN) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N. Y.
POLYETHYLENE CRYSTALLIZED FROM THE MELT UNDER

ELEVATED PRESSURE,
by Bernhard Wunderlich and Tamio Arakawa.
31 July 63, 15p. Technical rept. no. 6
Contracts Nonr40144 and Nonr49119, Task NR051 428
Unclassified report

Descriptors: (*Crystallization, Polyethylene plastics), (*Polyethylene plastics, Crystallization), Temperature, Pressure, Melting, X-ray diffraction analysis, Electron microscopy, High-pressure research, Crystal structure, Crystals, High-temperature research.

An account is given of experiments on crystallization of linear polyethylene from the melt under varied temperature and pressure conditions. The experiments led to a highly crystalline state never before attained. The morphology of these high pressure crystals was found to be of the extended chain type and is described in a separate publication. Here the melting behavior, crystallinity and surface free energy are discussed. (Author)

AD-414 935 Div. 14, 26
(TISTM/ODN) OTS price $15.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LUBRICANT - COOLANT FLUIDS IN CUTTING METALS AND THE TECHNIQUE OF THEIR APPLICATION (SELECTED PARTS),
by M. I. Klushin. 9 May 63, 222p.
FTD TT63 105 Unclassified report

Trans. from Smazochno-Okhlazhdayushchiye Zhidkosti Pri Rezanii Metallov I Tekhnika Primeneniya, Mashgiz, Moskva, 53-97, 112-141, 168-269, 280-290, 1961.

Descriptors: (*Lubricants, Grinders), (*Coolants, Machining), Metals, Grinding wheels, Cutting tools, Steel, Alloys, Stainless steel, Life expectancy, Data, Lubrication, Taps.

Contents: The Effect of Various Lubricants and Coolants on the Quality of Tap-Cut Threads; The Utilization of Lubricant-Coolant Fluids in Grinding Operations; Cooling and Lubricating the Cutting Zones by High-Pressure Fluid Stream; and Lubrication and Cooling with Dispersed Liquids during the Reaction of Metals.

AD-414 955 Div. 14
(TISTM/AM) OTS price $3.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
LOAD TEST DATA FOR LAKE ICE SHEETS,
by Guenther E. Frankenstein. Jan 63, 29p.
CRREL Technical rept. 89
Unclassified report

Descriptors: (*Lakes, Ice), Tests, Loading (Mechanics), Test equipment, Data, Failure (Mechanics), Thickness.

The results of 13 load tests, conducted in Mich. and N. Dak. to determine the bearing capacity of lake ice, are reported. In 7 tests (large load) a tank 12 ft in diam was placed directly on the ice and filled with water pumped from the lake until the ice broke, in the remaining 6 cases (concentrated load) the tank rested on a wooden block 17.3 in. in diam and the same procedure was followed. Complete failure of the ice was attempted in all cases, but was not achieved in 2 cases. Failure loads and ice deflections were greater in the large load tests than in the concentrated load tests for similar ice thicknesses. Circumferential and radial cracks formed during the large load tests, but only radial cracks formed during the concentrated loadings, consequently in the concentrated loading tests there was no indication of when the ice would fail. The essential data of each test are graphed and tabulated. (Author)

AD-414 975 Div. 14, 25
(TISTM/ODN) OTS price $4.60

Aerospace Corp., Los Angeles, Calif.
EFFECTS OF TEMPERATURE, STRAIN RATE, AND SWELLING ON THE STRESS-STRAIN PROPERTIES OF STYRENE-BUTADIENE GUM VULCANIZATES OF VARYING CROSS-LINK DENSITIES,
by T. J. Dudek. 2 Aug 63, 41p. TDR169 3240 22 TN1
Contract AF04 695 169
SSD TDR63 165 Unclassified report

Descriptors: (*Vulcanizates, Stresses), (*Polymers, Vulcanizates), (*Styrene plastics, Vulcanizates), Strain (Mechanical), Elasticity, Theory, Organic solvents, Benzene, Measurement, Equations, Mechanical properties, Experimental data, Tensile properties, Temperature, Butyl rubber.

The stress-strain properties and ultimate properties of SBR gum vulcanizates of varying cross-link density (swollen and unswollen) were determined at two temperatures and two strain rates. The polymer/solvent interaction parameter for the system SBR-benzene at 25 C was determined as a function of cross-link density. The network structural parameters obtained from swollen measurements were 30 to 40% lower than values obtained from unswollen measurements at high temperatures. The Mooney-Rivlin constants were found to depend on temperature, strain rate, and cross-link density. The constant 2C sub 1 could not be used in the statistical theory equation as the network structural parameter to predict the equilibrium behavior of unswollen vulcanizates. Thermoelastic measurements confirmed that SBR undergoes a negative internal energy change on extension due to rotational energy levels within the chains; however, this did not decrease the Mooney-Rivlin C sub 2 term. The ultimate properties (swollen and unswollen), when plotted as log (sigma sub B/G) versus log alpha sub B, described in a single curve that was independent of time and temperature as was found by Landel and Fedors. (Author)

AD-414 976 Div. 14
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF OBTAINING LITHIUM GREASES,
by M. K. Badayeva and K. P. Grinevich. 20 Aug 63, 3p.
FTD TT63 604 Unclassified report

Trans. from Russian patent no. 151755 (Appl. No. 749725/23-5, pp. 1-2, 24 Oct 61.

Descriptors: (*Greases, Lithium compounds), (*Lithium compounds, Greases), Patents, Manufacturing methods, Soaps, Mineral oils, Silcone plastics, Esters, Stabilization, Corrosion inhibition, Wear resistance.

AD-414 983 Div. 14, 4
(TISTM/REB) OTS price $6.60

United States Rubber Co., Wayne, N. J.
PHOSPHONITRILIC POLYMERS STABLE AT HIGH TEMPERATURES.
Technical rept. no. 2, 1 Mar-31 May 63.
by Harold K. Garner and Gerald J. Klender.
9 Aug 63, 63p.
Contract NObs88232, Proj. SR007 03 03, Task 1000
Unclassified report

Descriptors: (*Polymers, Phosphorus compounds), (*Phosphonitrile chlorides, Thermoplastics), (*Thermosetting resins, Phosphonitrile chloride), (*Thermoplastics, Phosphonitrile chloride), Polymerization, Electrical equipment, Substitution reactions, Amines, Electrical properties, Stability, Alcohols, Sodium compounds, Heat-resistant materials.

The objective of this project is the development of new thermoplastic and thermosetting resins from phosphonitrilic chloride trimer for high temperature electrical applications. This report covers an investigation of the course of reactions leading to monomers of reduced functionality. In particular, the reactions of phosphonitrilic trimer with ethanol in the presence of triethylamine, with phenol in the presence of triethylamine, with sodium phenoxide, and with dimethylamine are discussed. Preliminary polymerization studies on several monomers are reported. (Author)

AD-415 054 Div. 14
(TISTM/TCG) OTS price $1.50

Saarlands U. (Germany).
THEORETICAL INVESTIGATIONS OF THE BEHAVIOR OF BRITTLE MATERIALS AT VARIOUS RANGES OF TEMPERATURE.
Final rept., 1 Jan-31 Dec 62,
by Phil Udo Wegner. July 63, 48p.
Proj. 7350, Task 735003
ASD TDR63 490 Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Materials, Brittleness), (*Elasticity, Theory), Plasticity, Deformation, Stresses, Anisotropy, Refractory materials, Mathematical analysis.

A new theory of elasticity was developed which will provide a mathematical treatment of the behavior of brittle materials. By postulating two axioms concerning the invariance of the deformation energy under any coordinate transformation and the continuous transition of the volume dilatation from the elasticic to the plastic range it was possible to establish a general invariant non-linear stress-strain relation for the three-axial state of stress. For the extension of the theory to anisotropic media some group theoretical considerations are performed in order to establish the general form of the deformation energy for these media. (Author)

AD-415 056 Div. 14, 25
(TISTM/BRW) OTS price $1.10

Naval Ordnance Lab., Corona, Calif.
OPTICAL PROPERTIES OF Cu-DOPED InSb FILMS,
by R. F. Potter and G. G. Kretschmar. 1 Aug 63, 9p.
NAVWEPS Rept. 8160 Unclassified report

Descriptors: (*Semiconducting films, Optical properties), (*Intermetallic compounds, Metal films), (*Metal films, Vapor plating), Indium alloys, Antimony alloys, Dielectric films, Aluminum compounds, Oxides, Impurities, Copper, Electrical properties, Refractive index, Light transmission.

The three-temperature technique for preparing InSb layers has been modified for counter-doping by simultaneously evaporating copper with the principal constituents. Electrical and optical measurements indicate qualitatively that the resultant layers have properties similar to those of p-type polycrystalline bulk InSb. Evaporated p-type InSb films show good transmittance characteristics to 35 microns. (Author)

AD-415 202 Div. 14
(TISTM/TCG) OTS price $2.60

Forest Products Lab., Madison, Wis.
COMPARISON OF THE PERFORMANCE OF DESICCANT-COATED PAPERS OR BARRIERS AND BAGGED DESICCANT,
by A. A. Mohaupt. June 63, 20p.
Unclassified report

Descriptors: (*Desiccants, Paper), (*Paper, Coating), (*Bags (Containers), Desiccants), Silicon compounds, Dioxides, Crystals, Humidity, Absorption, Water.

Several groups of specimens were exposed to high humidity to evaluate the use and performance characteristics of desiccant-coated papers and barriers as compared to bagged desiccant. The capacity of the bagged desiccant was substantially greater than the desiccant-coated paper due to the larger size of silica gel crystals, but the rate of adsorption was initially greater for the coated paper. When pouches were prepared of a barrier coated with desiccant or containing bag desiccant, the ability of the desiccant systems to adsorb water was far in excess of the transmission rate of the barrier, and therefore the adsorption rates represent the permeability of the individual barrier or test specimen. The binder of desiccant-coated papers and barriers appeared to reduce the tendency to produce fine loose particles referred to as dusting, but this advantage was partially offset by other factors such as limited loading of desicant, lack of heat sealability, and the exclusion of barriers that soften or melt below 250 F (the reactivation temperature of the desiccant). (Author)

15. MATHEMATICS

AD-414 115 Div. 15, 32
(TISTP/MFA) OTS price $7.60

Geneva U. (Switzerland).
A BIBLIOGRAPHY ON FUNCTIONAL EQUATIONS.
Annual summary rept. no. 1,
by Gyorgy I. Targonski. 30 Apr 63, 74p.
Contract AF61 052 602
AFOSR 4973 Unclassified report

Descriptors: (*Bibliographies, Functions), Equations.

This is a bibliography on the literature of functional equations, up to approximately the middle of 1962. It consists of two parts: a list of papers and books up to the end of 1945, and a similar list from 1946 on, with remarks on the contents. This sub-division is due to the fact that the author was not able to devote more than

a fraction of his time to this work. It is planned that the first part shall be re-edited with comments similar to the second, and eventually the whole bibliography shall be streamlined into a whole. In order to compile such a bibliography, it was necessary first to define a Functional Equation. This has been done in the past several ways, some of which appear too wide, others too narrow. In the most general case, a Functional Equation is an equation which serves to determine one, or more unknown functions, or classes of such functions. In this sense, every differential,-difference, and integral equation is also a Functional Equation; to compile a bibliography on such a wide class is almost certainly impossible and most certainly unnecessary. (Author)

AD-414 127 Div. 15
(TISTP/HG) OTS price $8.10

North Carolina State Coll. of Physical Sciences and Applied Mathematics, Raleigh.
DUAL SERIES RELATIONS,
by Ian N. Sneddon. Mar 63, 81p.
Contract AF49 638 1159
AFOSR 5043
Unclassified report

Descriptors: (*Series, Analysis), (*Boundary-value problems, Mathematical analysis), (*Integral equations, Numerical analysis), Sequences, Operators, Functions, Fourier analysis, Bessel functions, Polynomials, Equations, Special functions, Complex variables, Inequalities, Electrostatics, Hydrodynamics, Thermodynamics, Torque, Stresses.

AD-414 513 Div. 15
(TISTP/HG) OTS price $1.60

Northwestern Technological Inst., Evanston, Ill.
NOTES ON LINEAR INEQUALITIES, I: THE INTERSECTION OF THE NONNEGATIVE ORTHANT WITH COMPLEMENTARY ORTHOGONAL SUBSPACES,
by Adi Ben-Israel. July 63, 12p. O.N.R. Research Memorandum no. 78
Contract Nonr1228 10, Proj. NR047 021
Unclassified report

Descriptors: (*Equations, Theory), (*Inequalities, Matrix algebra), Linear programming, Projective geometry.

The intersections of the nonnegative orthant in E to the Nth power with pairs of complementary orthogonal subspaces are investigated. Applications to linear inequalities and linear programming are then made by using Fredholm's alternative theorem. (Author)

AD-414 523 Div. 15
(TISTP/JP) OTS price $2.60

RAND Corp., Santa Monica, Calif.
INVARIANT IMBEDDING AND THE ANALYSIS OF PROCESSES,
by Robert Kalaba. Aug 63, 23p. Memo. RM3806PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Boundary value problems, Control systems), Sequences, Transport properties, Transformations, Fluid flow, Particles, Reflection, Linear systems, Perturbation theory, Neutron flux.

Many of the processes considered in modern physics and control theory lead, from the mathematical viewpoint, to nonlinear two-point boundary-value problems. These problems are difficult to treat computationally and analytically. A goal of the theory of invariant imbedding is to provide a systematic technique for converting these boundary-value problems into initial-value problems through use of appropriate variables and the employment of functional equation techniques. A particle multiplication process is considered for illustrative purposes. The classical equations and the invariant imbedding equations are derived and various interconnections are discussed. The paper is intended to be self-contained. (Author)

AD-414 587 Div. 15, 25
(TISTP/MFB) OTS price $7.60

Brown U., Div. of Applied Mathematics, Providence, R. I.
ON GREEN'S FUNCTIONS AND SAINT-VENANT'S PRINCIPLE IN THE LINEAR THEORY OF VISCOELASTICITY,
by Eli Sternberg and S. Al Khozaie. July 63, 69p. TR21
Contract Nonr56225, NR064 431
Unclassified report

Descriptors: (*Viscoelasticity, Theory), (*Green's functions, Analysis), (*Mechanics, Numerical analysis), Boundary-value problems, Vector analysis, Partial differential equations, Integrals, Equations, Transformations (Mathematics), Sequences, Real variables, Taylor's series, Functions, Spheres, Elasticity, Statics, Stresses, Algebra.

AD-414 598 Div. 15
(TISTP/HG) OTS price $1.60

Northwestern Technological Inst., Evanston, Ill.
NOTES ON LINEAR INEQUALITIES, II: THE GEOMETRY OF SOLVABILITY AND DUALITY, IN LINEAR PROGRAMMING,
by Adi Ben-Israel. Aug 63, 8p.
Contract Nonr 1228 10, Proj. NR047 021
ONR Research memo. no. 80
Unclassified report

Descriptors: (*Linear programming, Inequalities), Geometry, Equations.

Solvability and boundedness criteria for dual linear programming problems are given in terms of the problem data and the intersections of the nonnegative orthant with certain complementary orthogonal subspaces. (Author)

AD-414 620 Div. 15
(TISTP/TL) OTS price $1.60

RAND Corp., Santa Monica, Calif.
ANALYSIS OF A NEW FORMALISM IN PERTURBATION THEORY,
by T. A. Brown. June 63, 7p. Memo. RM3734PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Perturbation theory, Analysis), Transformations (Mathematics), Functions, Linear systems, Sequences, Integral equations.

A large number of problems of mathemattttical physics may be reduced to the solution of the equation u = f + lambdaT(u), where T is a linear transformation. Such problems are treated by means of continued fractions to a more tractable method involving series, and demonstrates the convergence of the resulting series over a larger domain than the classical Neumann series. (Author)

AD-414 707 Div. 15
(TISTP/TL) OTS price $3.60

Minnesota U., St. Paul.
CONTRIBUTIONS TO THE THEORY OF RANK ORDER STATISTICS THE TWO SAMPLE CASE: FINE STRUCTURE OF THE ORDERING OF PROBABILITIES OF RANK ORDERS,
by I. Richard Savage and Milton Sobel. Aug 63, 29p. Technical rept. no. 29
Contract Nonr71031, Proj. NR042 003
Unclassified report

Descriptors: (*Statistical analysis, Theory), (*Probability, Sampling), Transformations, Integral transforms, Integrals, Statistical functions.

AD-414 717 Div. 15
(TISTP/HG) OTS price $9.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ARITHMETIC SIMULATION OF RANDOM PROCESSES,
by A. G. Postnikov. 4 June 63, 98p.
FTD TT62 1367 Unclassified report

Trans. from Izdatel'stvo Akademii Nauk SSSR, vol. 57, pp. 1-84, 1960.

Descriptors: (*Mathematical models, Simulation), (*Sequences, Theory), (*Special functions, Numerical analysis), Statistical functions, Statistical processes, Functions, Continued fractions, Probability, Numbers, Series, Inequalities, Equations, Measure theory, Transformations, Taylor's series, Algebraic topology, Algebra, Matrix algebra.

AD-414 738 Div. 15
(TISTP/JP) OTS price $1.10

Emmanuel Coll. Research Language Center, Boston, Mass.
THE CONDITIONALITY OF MATRICES (Ob obuslovlennosti matrits),
by D. K. Faddeev, tr. by Richard M. Holden.
Apr 63, 7p. Rept. no. ETR63 8
Contract AF19 604 8505
Unclassified report

Trans. from Matematicheskii institut Steklov, Trudy, vol. 53, pp. 387-391, 1959.

Descriptors: (*Matrix algebra, Stability).

AD-414 749 Div. 15
(TISTP/JP) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
SUMMARY OF ANALYTICAL THEORY OF THE QUEUEING PROBLEMS RELATING TO A GROUP OF TELEPHONE LINES WHERE CALLS ARE TREATED TO ''FIRST COME, FIRST SERVED.'' (Theorie Analytique des Problemes Stochastiques Relatifs a un Groupe de Lignes Telephoniques avec Dispositif d'Attente),
by Felix Pollaczek. June 63, 26p. Technical note BN323
Contract Nonr595 17
Unclassified report

Descriptors: (*Queueing theory, Complex variables), Probability theory, Functions, Integrals, Integration, Fourier analysis, Integral equations, Integral transforms.

The most obvious queueing problems are presented concerning a bundle of s fully availavle telephone trunks (or a system of s equally accessible counters) where calls (or customers) are treated according to the rule ''first come, first served''. This analysis of these probability problems borrows nothing from probability calculus except the very notions of probability, of dependent or independent chance variables and of distribution functions (d. f.) of one or several variables; instead the elementary parts of the theory of analytical functions of one complex variable are used. (Author)

AD-414 807 Div. 15
(TISTP/FEM) OTS price $2.60

Naval Research Lab., Washington, D. C.
A NUMERICAL METHOD FOR THE TRANSIENT RESPONSE OF NONLINEAR SYSTEMS,
by G. J. O'Hara and P. F. Cunniff. 21 June 63, 18p.
NRL 5917 Unclassified report

Descriptors: (*Nonlinear systems, Numerical analysis), (*Numerical methods and procedures, Nonlinear differential equations), Integration, Linear systems, Oscillators, Functions, Integrals, Differential equations, Damping, Equations, Computers, Analysis, Models (Simulations).

Numerical integration equations are derived for determining the response of nonlinear systems subjected to transient loads. The numerical method consists of approximating the nonlinear variables and the forcing functions in the differential equations over a short interval of time by their mean value, by a straight line, or by a parabola. This allows for Duhamel integral type solutions for the nonlinear terms. A step by step solution follows which uses an iteration method during each increment of the solution. The sufficient condition for the convergence of the iteration method is presented for the case of N numerical equations. A scaling law is presented which eliminates linear damping from the equation of motion by a prescribed transformation. Example problems of a one-degree-of-freedom system and a two-degree-of-freedom system are solved by the numerical integration equations and the solutions are compared with response curves obtained from analog computers at NRL. (Author)

AD-414 838 Div. 15
(TISTP/HG) OTS price $8.60

Michigan State U., East Lansing.
QUASI-MARTINGALES AND STOCHASTIC INTEGRALS,
by Donald L. Fisk. 2 Aug 63, 92p. Technical rept. no. 1
Contract Nonr258702
Unclassified report

Descriptors: (*Statistical analysis, Groups mathematics), (*Stochastic processes, Integrals), (*Probability, Measure theory), Functions, Real variable, Integration, Sequences, Convex sets.

AD-415 001 Div. 15
(TISTP/HG) OTS price $4.60

Aeronutronic, Newport Beach, Calif.
THE SPADATS MATHEMATICAL MODEL,
by C. Geoffrey Hilton. 5 Aug 63, 45p. Pub. no. U2202
Contract AF19 628 562
ESD TDR63 427 Unclassified report

Descriptors: (*Mathematical models, Satellites), (*Celestial guidance, Tracking), (*Pertubation theory, Numerical analysis), Elliptical orbital trajectories, Celestial mechanics, Motion, Velocity, Measurements, Sampling, Programming, Statistical analysis, Integration, Azimuth.

The mathematical model presently used by the Space Detection and Tracking System (SPADATS), operated by the U. S. Air Force, Air Defense Command, to describe the orbital motion of Earth satellites is presented. The formulation is given and the non-Keplerian terms are justified. Various output formats of the system are described and defined. Limitations of the model are discussed in a qualitative fashion. (Author)

AD-415 002 Div. 15
(TISTP/HG) OTS price $5.60

Carnegie Inst. of Tech., Pittsburgh, Pa.
ON THE COMPARISON OF THE MEANS OF TWO POPULATIONS WITH UNKNOWN VARIANCES.
Final rept. Sep 61-June 62,
by Ying Yao. June 63, 54p.
Contract AF33 616 8234, Proj. 7071, Task 7071 01
ARL 63 106 Unclassified report

Descriptors: (*Statistical analysis, Statistical distribution), (*Analysis of variance, Sampling), Series, Probability, Statistical functions, Least squares method, Inequalities, Numerical analysis.

This is a study of the problem of the comparison of the means of two populations with unknown variances using the method of "Approximate Degrees of Freedom." A modified version of the Welch method is given for the univariate situation, and an extension is given for the general multivariate situation. These methods are then compared with the asymptotic series solution with respect to their significance levels. (Author)

AD-415 018 Div. 15
(TISTP/MFA) OTS price $2.60

Catholic U. of America, Washington, D. C.
RUNS TEST FOR A CIRCULAR DISTRIBUTION AND A TABLE OF PROBABILITIES,
by Chooichiro Asano. 19p. Rept. no. CU Biom5
Contract Nonr224905
Unclassified report

Descriptors: (*Statistical tests, Distribution theory), (*Probability, Tables), Combinatorial analysis, Sampling.

A method is suggested for testing whether two samples observed on a circle are drawn from the same distribution. The proposed test is a modification of the well-known Wald-Wolfowitz runs test for a distribution on a straight line. The primary advantage of the proposed test is that it minimizes the number of assumptions on the theoretical distribution. (Author)

AD-415 105 Div. 15
(TISTM/AW) OTS price $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
A BASIC PLAN FOR THE EVALUATION OF THE QUALITY OF PERIODIC MAINTENANCE ON SUBSYSTEMS,
by A. J. Monroe. 8 July 63, 12p. Rept. no. 6101 8132TU000
Contract AF04 694 3
BSD TDR63 146 Unclassified report

Descriptors: (*Probability, Mathematical analysis), Maintenance, Maintainability, Failure (Mechanics), Equations, Checkout procedures.

A basic step by step plan for evaluating the quality of periodic maintenance of single-unit equipment is presented. All mathematical derivations have been relegated to reference documents in the interests of simplicity and only the required data and formulae are given. (Author)

AD-415 156 Div. 15
(TISTP/AG) OTS price $3.60

Brown Engineering Co., Huntsville, Ala.
PROJECTED AREAS OF AXIALLY SYMMETRIC SURFACE SECTIONS FOR SEVERAL GEOMETRIC FIGURES,
by A. R. Phillips. 7 May 62, 35p. Technical note R18
Contract DA01 0090RD1019
Unclassified report

Descriptors: (*Projective geometry, Bodies of revolution), Equations, Integration, Spheres, Conical bodies.

Equations permitting the calculation of the projected areas of arbitrary, axially symmetric surface bands are derived for the cone, sphere section, and cylinder. The equations apply to viewing angles ranging from 0 to 90 degrees, measured from the symmetry axes. (Author)

AD-415 169 Div. 15, 5
(TISTA/VGW) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEMS OF CYBERNETICS (SELECTED ARTICLES).
16 Aug 63, 49p.
FTD TT63 544 Unclassified report

Trans. from Problemy Kibernetiki, No. 5, Gosudarstvennoye Izdatel'stvo Fiziko-Mathematicheskoy Literatury, Moskva, pp. 105-121 and 123-136, 1961.

Descriptors: (*Cybernetics, Matrix algebra), Communication theory, Coding, Groups (Mathematics), Errors, Detection.

Mathematical studies are presented on group code theory, and the application of the Hadamard Matrix to a single problem of coding. (Author)

AD-415 360 Div. 15
(TISTP/JP) OTS price $2.60

RAND Corp., Santa Monica, Calif.
TWO NOTES ON THE LOGNORMAL DISTRIBUTION,
by Milton Kamins. Aug 63, 26p. Memo. RM3781PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Statistical distributions, Numerical analysis), Probability, Queueing theory, Reliability, Failure (Mechanics), Programming language, Programming (Computers), Statistical tests, Statistical processes.

Two potentially useful elements of information concerning the lognormal distribution are provided which may be helpful to persons engaged in studies concerning either the solution of queueing problems through simulation or the effects of failure characteristics on reliability. One is a very simple but flexible procedure (with an example in the widely used FORTRAN computer language) for generating a series of observations drawn from a logonormally

distributed population. This method can provide improved realism and accuracy in the computer simulation of servicing queues when the service-time distribution is known to be lognormal. The other is an analysis of one feature of the lognormal distribution of times-to-failure: a peak in the failure rate. It provides information concerning the age at which the peak occurs, its magnitude, and certain related asymptotic properties. (Author)

AD-415 394 Div. 15
(TISTP/HS) OTS price $1.60

Chicago U., Ill.
AN APPLICATION OF PROHOROV'S THEOREM TO PROBABILISTIC NUMBER THEORY,
by Patrick Billingsley. 1963, 14p. Rept. no. SRC630123Bi20 rev.
Unclassified report

Descriptors: (*Number theory, Probability), (*Measure theory, Sequences), Transformations (Mathematics), Functional analysis, Functions, Inequalities, Topology, Operators (Mathematics).

The purpose of this paper is to give a probabilistic proof of a theorem which contains as special cases certain results about the natural densities of arithmetically interesting sets of integers, results usually conjectured on probabilistic grounds but proved by nonprobabilistic methods. The principle tool is Prohorov's theorem on the weak compactness of probability measures. Results similar to those of this paper, but for logarithmic density rather than natural density, have been proved, by very different methods. (Author)

16. MEDICAL SCIENCES

AD-414 101 Div. 16
(TISTB/AAR) OTS price $3.60

University Coll. Cork, Eire.
STUDY OF THE PROPERTIES AND STRUCTURE OF PURIFIED MAMMALIAN ADENOSINE DEAMINASE ISOLATED FROM CALF INTESTINE.
Annual technical status rept. no. 2, 1 July 62-1 July 63,
by Thomas G. Brady. July 63, 28p.
Contract DA91 591euc2257, Proj. 01 7765 61
Unclassified report

Descriptors: (*Enzymes, Chemistry), Bouines, Infants, Intestine, Purification, Lungs, Tissues, Chromatographic analysis, Amino acids, Ultraviolet spectrophotometers, Biochemistry.

AD-414 189 Div. 16, 14
(TISTM/ODN) OTS price $1.60

Interchemical Corp., New York.
WASHFAST INSECT REPELLENT FINISH FOR COTTON FABRICS.
Rept. no. 2 (Final), 15 Apr-30 June 63,
by John R. Abrams and V. Lindsay Chase.
30 June 63, 11p.
Contract DA49 193 MD 2355, Proj. 94022 300
Unclassified report

Descriptors: (*Insect repellants, Cotton textiles), (*Cotton textiles, Insect repellants), Amides, Protective treatments, Culicidae, Mites, Toxicity, Acrylic resins, Silicone plastics, Vinyl plastics, Polymers, Tests, Solutions, Organic nitrogen compounds, Aromatic compounds.

Deet in various binder systems was applied to cotton fabrics by a padding operation. Because of the low order of fastness found, emphasis has shifted from repellence to mosquitos to toxicity to chiggers and samples were tested for the latter. All but one were tested only after a standardized rinse. Three gave fairly good protection from chiggers: molecular sieve-ethyl cellulose, silicone resin and vinyl copolymer. Four gave fair protection: ethyl cellulose, polyethylene, deet trapped in fiber overpadded with deet-acrylic resin and again overpadded with melamine formaldehyde resin and imine terminated polymer cured at room temperature with carboxyl containing polymer. Four gave poor protection--room temperature moisture curing polyurethane, ethyl cellulose overpadded with fluorochemical, carboxy containing acrylic terpolymer and locked-in deet. Contrary to results expected from previous experiments, there was one fabric in which deet could not be trapped, presumably because of a finish on the fabric. (Author)

AD-414 323 Div. 16
(TISTB/CCH) OTS price $3.60

Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY,
by B. Botha and D. Shurtleff. July 63, 1v.
Rept. no. TM3515
Contract AF33 600 39852, Proj. 703
ESD TDR63 249 Unclassified report

Descriptors: (*Tachistoscopes, Visibility), (*Visibility, Errors), Vision, Display systems, Operation, Tables, Reaction (Psychology), Time.

The purpose of this study was to determine the effects on the legibility of capital alphabetic letters of: (a) two simulated TV rasters with horizontal, linear scan constructions of 11 and 5 lines per letter height and a solid (continuous) construction of infinite lines per letter height, (b) two visual exposure times of 0.03 and 0.003 second, and (c) two letter stroke-widths of 16% and 28% of letter height. Four subjects identified the letters presented singly in a tachistoscope under all combinations of these conditions. Legibility was measured three ways: by information transmitted (in bits), by errors in identification, and by verbal reaction time. The results showed that for the 0.03-second exposure time, the letters constructed with 11 lines were as legible as solid (continuous stroke) letters, but the line construction was less legible at 0.003-second exposure. At both exposure times, the 5-line construction was less legible than the solid construction. With 5-line construction and 0.003-second exposure, the wide stroke-width gave better legibility than the narrow width. Confusion between specific letters varied for both line constructions and stroke-widths. The possible effects on legibility of changes in brightness, contrast and letter geometry introduced by the experimental conditions are discussed. It was concluded that the legibility of letters generated by a horizontal kinear scan construction is highly dependent upon apparently minor differences in letter geometry. (Author).

Division 16 - MEDICAL SCIENCES

AD-414 329 Div. 16
(TISTB/WA) OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS. A. BIOSCIENCES.
3 July 63, 17p.
AID Reports P63 91; 15
Unclassified report

Descriptors: (*Biology, Reports), (*Reports, Biology), (*Life support), Space medicine, Physiology, Psychology, Space environmental conditions, Instrumentation, Survival.

AD-414 344 Div. 16
(TISTB/WA) OTS price $10.10

USAF Radiation Lab., U. of Chicago, Ill.
(No title).
Quarterly progress rept. no. 48.
by Kenneth P. DuBois. 15 July 63, 126p. Rept. 48
Contract AF41 609 1693, Proj. 7757 02.
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Radiation effects, Tissues (Biology)), Enzymes, X-rays, Liver, Chemical compound (Organic), Lethal dosage, Survival, Neutrons, Toxicity, Rare earth compounds, Gamma rays, Radioprotective agents.

Contents: (1) The effects of ionizing radiations on the biochemistry of mammalian tissues; (2) Pharmacological and texicological compounds as protective or therapeutic agents against radiation injury in experimental animals; (3) The influence of exposure to low levels of Gamma and fast neutron irradiation on the life span of animals. (Author)

AD-414 386 Div. 16
(TISTB/WA) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
VISUAL INFORMATION PROCESSING IN INSECTS.
Rept. for 14 Oct 61-14 Oct 62,
by James C. Bliss. Nov 62, 42p. TR1
Contract AF49 638 1112
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Insects, Vision), Nerve cells, Optic nerve, Behavior, Physiology, Stimulation, Coleoptera, Histology, Anatomy, Eye, Models (Simulation), Mathematical models, Perception.

This report describes mathematical analysis, behavior experiments, and neurophysiolo cal experiments aimed at determining the mech sms of visual perception in insects. The behavioral experiments with the beetle Lixus indicate that spatial processing involving autocorrelation is being performed among the ommatidia of the eye. This processing was studied by means of an optomotor reaction involving a turning tendency with movement in the visual field. Visual processing in the beetle Lixus was also studied by means of microelectrode recording of electrical nervous activity. The electroretinogram (ERG) was measured for various visual stimuli and Bode diagrams were determined for small changes in light intensity. Nonlinear effects were also noted for large changes in light intensity. Spike potentials were obtained from a single cell which fired with a change in light intensity. Spike potentials were also obtained from the ventral nerve cord, anterior thoracic region, and motor nerve stump of the first joint of the right front leg. A functional model is proposed to explain the behavioral and neurophysiological results. (Author)

AD-414 496 Div. 16
(TISTB/AAR) OTS price $1.60

Mississippi U. School of Medicine, Jackson.
PHYSIOLOGICAL ADAPTATION TO ENVIRONMENTAL CHANGES.
Final rept., 1 Dec 61-1 July 63,
by Jack W. Crowell. 1 July 63, 9p.
Contract DA49 193md2219
Unclassified report

Descriptors: (*Adaptation (Physiology), Environmental tests), Dogs, Tissues (Biology), Cardio vascular system, Hematology, Altitude chambers, Viscosity, Blood, Oxygen, Respiration, Flowmeters, Mathematical analysis.

AD-414 509 Div. 16
(TISTB/WA) OTS price $1.60

Bonn U. (Germany).
NATURAL TOXIC AND NARCOTIC COMPOUNDS FROM PLANTS.
Final technical rept., 1 July 62-30 June 63,
by R. Tschesche. 30 June 63, 13p.
Contract DA91 591EUC2580
Unclassified report

Descriptors: (*Plants (Botany), Chemical compounds), (*Chemical compounds, Plants (Botany)), (*Toxicity, Plants (Botany)), Narcotics, Chemical analysis.

AD-414 531 Div. 16
(TISTB/AAR) OTS price $1.60

Hazelton Labs., Falls Church, Va.
MEASUREMENT OF 17-HYDROXYCORTICOSTEROIDS IN URINE

DEVELOPMENT OF A METHOD FOR THE MEASUREMENT OF PREGNANEDIOL IN URINE.
Final rept., 1 Feb 62-31 July 63,
by Edward A. Garlock, Mary Ann Hurley, and Harold J. Paulin. 23 Aug 63, 10p.
Contract DA49 193MD2318
Unclassified report

Descriptors: (*Steroids, Measurment), (*Progesterone, Chemical analysis), Corticosteroid agents, Pregnancy, Urine, Enzyme, Hydrolysis, Chromatographic analysis.

The progress of the development of a method for the analysis of urinary pregnanediol is described. The urine is subjected to enzymatic hydrolysis and solvent extraction and the pregnanediol is determined by gas-liquid chromatography. (Author)

AD-414 609 Div. 16
(TISTB/WA) OTS price $23.50

School of Aerospace Medicine, Brooks Air Force Base, Tex.
LECTURES IN AEROSPACE MEDICINE, 4-8 FEBRUARY 1963. 1963, 456p.
Unclassified report

Descriptors: (*Space medicine, Symposia), (*Symposia, Space medicine), Astronauts, Training, Toxicity, Manned spacecraft, Lunar probes, Closed-cycle ecological systems, Biochemistry, Launching sites, Physiology, Cosmic rays, Solar flares.

AD-414 660 Div. 16
(TISTB/AAR) OTS price $1.10

University of Southern Calif., School of Medicine, Los Angeles.
A STUDY OF SERUM HEPATITIS FROM STORED PLASMA.
Annual progress rept., 1 Dec 62-1 Aug 63,
by Allan G. Redeker. 1 Aug 63, 12p.
Contract DA49 193md2377
Unclassified report

Descriptors: (*Hepatitis (Nonviral), Blood serum), (*Blood serum, Preservation), Storage, Liver, Blood, Enzymes, Albumins, Distribution, Blood plasma.

A prospective controlled study of the frequency of hepatitis following the transfusion of pooled human plasma stored for six months in the liquid state at 30 - 32 Centigrade has been initiated. Surgical Service patients who receive only plasma and no other human blood products are the subjects of the study. The control solution, administered in a double-blind fashion, is five per cent human albumin solution. All patients allocated to the program are being followed in an identical manner, with clinical examinations and liver function studies at monthly intervals for a total of 180 days. Forth-seven patients were allocated to the follow-up study program from February 1 to August 1, 1963. Two patients have completed 180 days of study without evidence of hepatitis. No evidence of hepatitis has been present to date in the other patients under study, except for one subject. This patient developed a mild, anicteric lesion with slight serum transaminase elevations, from which he has recovered. Liver biopsy revealed mild focal changes consistent with mild anicteric hepatitis. (Author)

AD-414 704 Div. 16
(TISTM/RGR) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
PRIMER ACTIVITY OF THYMUS DNA FRACTIONATED BY ECTEOLA COLUMN CHROMATOGRAPHY,
by W. D. Skidmore, R. K. Main and L. J. Cole.
12 June 63, 21p.
Task MR005 08 1200
NRDL TR655 Unclassified report

Descriptors: (*Desoxyribonucleic acids, Enzymes), (*Enzymes, Desoxyribonucleic acids), Metabolism, Chromatographic analysis, Separation, Chemical analysis, Phenols.

The DNA-primer activity of Ecteola fractionated calf- and rat-thymus DNA samples was determined by a DNA-polymerase assay system. All DNA samples assayed, heated or unheated, and fractionated or unfractionated, showed some degree of DNA-primer activity. The chromatographic profiles of heated DNA were different from those of unheated DNA. Phenol and p-aminosalicylate, used in the preparation of DNA, did not alter the patterns of DNA obtained by Ecteola chromatography. Sephadex chromatography was found to be a rapid and effective method to deionize DNA solutions. DNA-primer activity was increased by an ammonium hydroxide gradient. At 4 degrees, treatment of DNA by phenol and p-aminosalicylate, Ecteola column chromatography with a salt gradient, Sephadex column chromatography with deionized distilled water to desalt DNA, and lyophilization did not alter DNA-primer activity. The results indicate that DNA-primer activity, per se, is not specifically associated with one particular fraction of DNA. (Author)

AD-414 734 Div. 16
(TISTB/AAR) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
EFFECT OF MASSIVE SODIUM BICARBONATE INFUSION ON RENAL FUNCTION.
by G. S. Kanter. May 63, 8p.
Contract AF41 657 393, Task 775801
SAM TDR63 15 Unclassified report

Descriptors: (*Kidneys, Physiology), Sodium compounds, Bicarbonates, Alkaloids, Biochemistry, Temperature, Hematology, PH, Urine, Heart, Blood pressure.

The effect of both mild and severe acute alkalosis, due to intravenous sodium bicarbonate infusion, on glomerular filtration rate, renal plasma flow, and sodium and potassium clearance was investigated on 12 anesthetized dogs. The maximum load used was over 50 gm. of $NaHCO_3$ administered intravenously in 4 hours, at a rate of 2.5 mEq./minute. On a weight basis, in a 70 kg. man, this would be equivalent to a load of 195 gm. of $NaHCO_3$ given at the rate of nearly 10 mEq./minute. The plasma potassium fell from 3.8 to 2.7 mEq./liter, and the plasma sodium increased from 144.4 to 170.8 mEq./liter with maximum $NaHCO_3$ loading. There was no apparent acute detrimental renal effect. No depression of glomerular filtration rate nor of renal plasma flow was seen in any series although the pH increased from 7.32 to 7.61. Similarly no significant effect was seen on blood pressure, hematocrit, filtration fraction, heart rate, or rectal temperature in any series. Urine flow and urine pH increased significantly with higher loading rates and concentrations. (Author)

AD-414 750 Div. 16
(TISTB/REB) OTS price $8.10

Wisconsin U., Madison.
BIBLIOGRAPHY ON SALMONELLA EXCLUSIVE OF

SALMONELLA TYPHI -- 1960. SUPPLEMENT V.
1963. 84p.
Unclassified report

Descriptors: (*Bibliographies, Salmonella), (*Salmonella, Bibliographies), Antigens and antibodies, Immunology, Culture media, Antibiotics, Bacteriophages, Genetics, Epidemiology, Food Poisoning, Animals, Man, Diagnosis, Food.

AD-414 781 Div. 16
(TISTB/CCH) OTS price $3.60

Illinois U., Coll. of Medicine, Chicago.
THERMAL INJURY OF THE SKIN.
Annual progress rept., 15 Nov 58-1 May 60,
by Sol Roy Rosenthal. 1 May 60, 31p.
Contract Nonr145902, Proj. NR114 161
Unclassified report

Descriptors: (*Wounds and injuries, Skin), (*Thermal radiation, Skin), (*Skin, Thermal radiation), Man, Toxins and antitoxins, Blood serum, Blood.

''Toxins'' were demonstrated in the blood of acutely burned or injured human subjects as determined by the cytotoxic effect on Hela cells, the cytolytic effect on red cells of acutely burned or injured individuals, and precipitinogens against healed burn sera. ''Antitoxic-antibody''-like substances were demonstrated in the sera of healed burned individuals by their neutralization of the cytotoxic effect on Hela cells and the presence of ''hemolysins'' and precipitins. In preliminary clinical trials it was found that the administration of blood or plasma from healed burned donors to critically toxic burned or injured subjects was associated with a precipitous change in their clinical condition which was manifested by increasing awareness, appetite, and spontaneous mobility, and a decrease in local edema, pain, irritability, and restlessness. The post-transfusion sera of such critically ill subjects lost their tissue culture toxicity which corresponded with the clinical improvement. (Author)

AD-414 828 Div. 16
(TISTB/AAR) OTS price $1.60

George Washington U., School of Medicine, Washington, D. C.
STUDIES ON THE GENETICS OF VIRULENCE IN ENTERIC BACTERIA.
Final technical rept. 1 Dec 62-1 Sep 63,
by Robert Charles Wood. 1 Sep 63, 19p.
Contract DA49 193md2376
Unclassified report

Descriptors: (*Bacteria, Genetics), (*Genetics, Bacteria), Microorganisms, Shigella, Chromosomes, Escherichia, Salmonella.

Alterations were observed in the virulence of Shigella flexneri 2a for pretreated guinea pigs following hybridization by Escherichia coli K-12 Hfr strains. Genetic studies indicated gross chromosomal homology between these two speices. However, recombination frequencies were lower than those obtained in comparable E. coli X E. coli crosses, and extensive transfer of the Escherichia genome was detected only occasionally. Virulence tests on Shigella hybrids carrying overlapping segments of the Esgherichia chromosome revealed only one region, located between the rha+ and xyl+ genes, which was essential for virulence. Hybrids carrying the xyl+rha+ Escherichia region as a persistent exogenote displayed intermediate virulence; haploid segregants which lost this exogenote were fully virulent, while on haploid segregants which lost this exogenote were fully virulent, while one haploid which had incorporated it proved to be avirulent. Preliminary tests on a mouse-virulent Salmonella typhimurium hybridized by an avirulent Salmonella abony donor indicated that, in this species also, virulence may be lost on substitution of the xyl--rha+ region. Salmonella typhosa strain 643WSr, hybridized by mating with an E. coli Hfr strain, was found to exhibit enhanced recipient ability on remating with E. coli donors whose lead chromosomal region matched the genetic segment integrated by the hybrid. (Author)

AD-414 840 Div. 16
(TISTB/AAR) OTS price $1.10

Army Biological Labs., Frederick, Md.
ON THE NATURE OF IMMUNITY AGAINST PLAGUE,
by Ye. I. Korobkova and L. V. Samoylova. 3 Apr 63, 8p.
JPRS R3049D; ABL Trans. 768
Unclassified report

Trans. from Zhurnal Mikrobiologii (Journal of Microbiology), vol. 33, pp. 76-82, 1962.

Descriptors: (*Pasteurrella, Diseases), (*Bacteria, Immunity), Infections, Immunology, Microorganisms, Antigens and antibodies, Animals, Mice, Rats, Vaccines.

AD-414 841 Div. 16
(TISTB/AAR) OTS price $1.60

Army Biological Labs., Frederick, Md.
AEROSOL IMMUNIZATION WITH DRY POWDER VACCINES AND TOXOIDS,
by N. I. Aleksandrov, N. Ye. Gefen, K. G. Gapochko, N. S. Garin, and A. I. Maslov. 3 Apr 63, 9p.
JPRS R3049D; ABL Trans. 766
Unclassified report

Trans. from Zhurnal Mikrobiologii (Journal of Microbiology), vol. 33, pp. 31-37, 1962.

Descriptors: (*Aerosols, Immunity), (*Vaccines, Powders), Toxins and antitoxins, Brucella, Bacteria, Microorganisms, Immunology.

AD-414 858 Div. 16
(TISTB/LMH) OTS price $8.10

Laval U. (Canada).
NEUROHUMORAL CONTROL OF THYROTROPIC ACTIVITY.
Final rept., 1 Oct 60-31 May 63,
by Claude Fortier. 31 May 63, 1v.
Grant AF AFOSR61 15
AFOSR 4995 Unclassified report

Descriptors: (*Thyroid hormones, Medical research), Stress (Physiology), Thyroid gland, Surgery, Adrenal glands, Adrenocorticotropic hormones, Biosynthesis, Shock (Pathology), Abstracts.

This study was aimed at analyzing the changes in ACTH and TSH secretion, induced by such factors as stress, thyroidectomy, adrenalectomy, thyroid hormone administration or associations thereof, in terms of altered rates of synthesis, release or disappearance of these hormones, by concurrently assessing, as a function of time following onset of the stimulus, their concentrations in the pituitary and in the blood, and by determining their rates of disappearance from the circulation, following exogenous administration.

It was found that: (1) Stress, as exemplified by surgical trauma or faradic stimulation, in addition to stimulating ACTH secretion, simultaneously depresses the synthesis and release of TSH, but has no effect on the removal rate of circulating TSH. (2) Prior adrenalectomy does not influence the TSH response to stress which is therefore not mediated by corticosteroids, or by catecholamines of medullary origin. (3) Thyroidectomy slows down the disappearance rate of circulating TSH, in addition to stimulating TSH secretion. (4) Adrenalectomy depresses both the rate of secretion of TSH and its rate of removal from the circulation. (5) Small and larger doses of triiodothyronine respectively enhance the synthesis and block the release of TSH in the thyroidectomized animal. (Author)

AD-414 926 Div. 16
(TISTB/AAR) OTS price $1.60

Florida U., Gainesville.
EFFECT OF HYPOXIA ON THE RATE OF OXYGEN CONSUMPTION OF NEWBORN, YOUNG, AND ADULT MICE AT VARIOUS ENVIRONMENTAL TEMPERATURES,
by S. Cassin. May 63, 9p.
Contract AF41 609 1553, Task 775801
SAM B TDR62 122 Unclassified report

Descriptors: (*Oxygen consumption, Mice), (*Hypoxia, Mice), Temperature, Environmental tests, Infant, Physiology, Metabolism, Ecology, Measurement, Laboratory animals.

Critical Po2 that is, Po2 below the point at which oxygen consumption is reduced - was measured in newborn, 5-day-old, and adult mice. At thermoneutral environmental temperatures, the critical Po2 of newborn was 85 mm. Hg; that of 5-day-old mice was 100 mm. Hg; and that of adults was 70 mm. Hg. When ambient temperature was lower than the thermoneutral point, the critical Po2 was higher. The extra oxygen consumption used to combat the lowering of body temperature appeared to make the animal more vulnerable to hypoxia. Although the newborn mouse cannot resist hypothermia effectively, there was a slight increase in its oxygen consumption in response to mild hypothermia. Maximal oxygen consumption occurred at lower temperatures in the 5-day-old mouse than in the 1-day-old. Evidently, there is a rapid maturation of temperature-controlling mechanisms during growth. (Author)

AD-414 936 Div. 16
(TISTB/AAR) OTS price $9.10

Agricultural U., Wageningen (Netherlands).
PHYSICAL AND CHEMICAL STUDIES OF CHLOROPHYLL SYSTEMS,
by E. C. Wassink and G. H. M. Kronenberg.
1 Dec 62, 104p.
Contract AF61 052 270
AFOSR 4904 Unclassified report

Descriptors: (*Chlorophylls, Chemistry), Physical chemistry, Organic compounds, Enzymes, Energy, Carotenoids, Photosynthesis, Heat, Chemicals, Measurement, Bacteria, Absorption spectrum, Pigments, Proteins, Sodium compounds, Alcohols.

AD-414 954 Div. 16, 4
(TISTB/AAR) OTS price $1.10

New York Medical Coll., N. Y.
DISTRIBUTION AND COMPOSITION OF SIALIC ACIDS AND GLYCOPROTEINS.
Annual progress rept. no. 7,
by Ward Pigman. Aug 63, 10p.
Contract DA MD49 193 62G50
Unclassified report

Descriptors: (*Glycoproteins, Distribution), Chemical properties, Acids, Glands, Electrophoresis, Centrifuges, Proteins, Amino acids, Carbohydrates, Enzymes, Peptides, Bovines, Blood groups, Molecular weight.

The principal mucin of procine submaxillary glands has been isolated in a highly purified condition and analyzed. The mucin was electrophoretically and ultracentrifugally homogeneous: It was composed of: protein, 40%; sialic acid, 20%; hexosamines, 24%; galactose, 12%; fucose, 7%. The hexosamine was nearly all D-galactosamine, and the sialic acid was N-glycollylneuraminic acid. The amino acid pattern was similar to that reported earlier for other mucins and blood-group substances and was rich in serine, threonine, proline, and glycine and alanine. Further work has been done on the glycopeptides obtained by enzyme action (Pronase) on bovine submaxillary mucin. Dialyzable lycopeptides were obtained in about 80% yield and were fractionated on Sephadex G50. The average molecular weight was about 1400. Their composition and blood group activity are currently under study. (Author)

AD-414 994 Div. 16
(TISTB/AAR) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
FLOW VISUALIZATION EXPERIMENTS WITH A DOLPHIN,
by Noe William Rosen. Apr 63, 14p.
NAVWEPS Rept. 8062; NOTS TP3065
Unclassified report

Descriptors: (*Swimming, Cetacea), (*Hydrodynamics, Cetacea), Water, Design, Underwater, Fluid flow, Fishes, Motion.

The manner in which water flows about the body of a swimming dolphin is a subject conerning which little is known. In 1958, 2 years before the research described in this report, what appeared to be an immense transverse vortex was discovered by the author in the water spray over the back of a leaping dolphin. In addition, a peculiar system of large twin-armed transverse vortexes appeared in the spray wake behind its tail. Further original experiments that year with a fish led to the discovery by the author that a remarkable system of large discrete vortexes--the Fish Vortex System--exists in the water at the sides of a swimming fish. The resemblance of the dolphin's spray vortex to the fish vortexes in design and position was striking. These discoveries stimulated the further flow visualization research on dolphins reported here. The findings of this research indicate the presence of a vortex phenomenon under water about the body of a dolphin that resembles the Fish Vortex System. (Author)

AD-415 022 Div. 16
(TISTB/WA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
INACTIVATION OF ENCYSTING AZOTOBACTER CELLS BY IONIZING RADIATION,
Preliminary rept.,
by Thomas L. Roberts. May 63, 2p.
Task 775702
SAM TDR63 13 Unclassified report

Descriptors: (*Azotobacteraceae, Radiation effects), (*Radiation effects, Azotobacteraceae), Gamma rays, Encapsulation, X-rays, Analysis of variance.

Azotobacter cysts were exposed to x-ray, gamma ray, and proton radiation. Results indicate a sensitive response to low levels of radiations. Azotobacter cysts may offer a biologic system for dosimetry of ionizing radiations. (Author)

AD-415 029 Div. 16
(TISTB/AAR) OTS price $1.60

University Coll. of East Africa (Kampala Uganda).
PROFESSIONAL ACTIVITIES OF THE UNITED STATES MEDICAL RESEARCH AND DEVELOPMENT COMMAND PROJECT.
Annual progress rept., 1 Feb 62-31 Jan 63,
by Daniel H. Connor. 31 Jan 63, 13p.
Grant DA MD49 193 62 G56
Unclassified report

Descriptors: (*Communicable diseases, Scientific research), Diseases, Pathology, Medical research, Research program administration, Parasites.

AD-415 053 Div. 16
(TISTB/AAR) OTS price $1.60

Southwestern Medical School, U. of Texas, Dallas.
THE EFFECT OF LIPASE INGESTION UPON BLOOD LIPID LEVELS.
Rept. for 20 Mar 62-5 Apr 63,
by James C. McPherson and William W. Burr, Jr.
5 Apr 63, 3p.
Contract DA49 007md662
Unclassified report

Report on Studies on Lipid Metabolism using C14 Labeled Materials.

Descriptors: (*Lipids, Blood), (*Nutrition, Enzymes), Dogs, Man, Blood plasma, Determination, Density, Cholesterol, Measurement, Measurement, Metabolism, Carbon, Radioactive isotopes, Tracer studies.

Supplements of a highly purified lipase were given with fat test meals to human subjects and dogs in order to determine the effect on blood lipid levels. The optical density and hence lipid levels of the blood plasmas were lowered in all subjects when sufficient lipase was ingested. The total esterified fatty acid and triglyceride determinations confirmed this measurement of the decrease acid and triglyceride determinations confirmed this measurement of the decrease in blood lipid levels. Human subjects with lowered fasting O.D. values and E.F.A. appeared to require more lipase to obtain this effect. The blood cholesterol values of normal subjects were not affected, nor was that of a hyperlipemic subject who ingested the lipase for over a four week test period. In all human subjects, the serum lipase values were elevated when the blood lipid levels were lowered. The association of elevated blood lipase levels with decreased blood lipids suggest the possibility of a lipolytic action in the blood. (Author)

AD-415 098 Div. 16
(TISTB/WA) OTS price $1.10

Florida U., Gainesville.
THE EFFECT OF CARBONIC ANHYDRASE INHIBITION IN EXERCISING RATS,
by S. Cassin, M. J. Beck, P. Travis, S. Sanders and A. B. Otis. May 63, 6p.
Contract AF41 609 1553, Task 775801
SAM TDR63 22 Unclassified report

Descriptors: (*Enzymes, Carbonic anhydrase), (*Carbonic anhydrase, Inhibition), Physiology, Exercise, Rats, Hypoxia, Controlled atmospheres.

A series of experiments has been performed to ascertain the effect of carbonic anhydrase inhibition on the ability of rats to exercise in room air and in an atmosphere of 6% 02. In separate experiments, it was first established that peak plasma concentrations of the inhibitor acetazolamide after intraperitoneal injection and peak PC02 values in subcutaneous gas pouches occurred concomitantly at about 60 minutes. Rats trained to run on treadmills were able to run as long as 5 1/2 to 6 hours at 0.46 mile per hour in room air whether carbonic anhydrase was inhibited or not. When exercised in 6% 02, however, the animals in which carbonic anhydrase was inhibited ran 39% longer, on the average, than did control animals. The increase in ventilation, which is known to be induced during carbonic anhydrase inhibition, without consequent tissue hypocapnia and alkalosis probably accounted for the improved exercise performance of inhibited animals in a low-oxygen environment. (Author)

AD-415 165 Div. 16
(TISTB/AAR) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
THE AXON AS A NEURISTOR: AN ANALYSIS OF NERVE TRANSMISSION.
Interim rept. no. 1,
by Hewitt D. Crane. Nov 60, 38p.
Contracts Nonr321200 and AF33 616 7567, SRI Proj. 3286
Unclassified report

Descriptors: (*Nerves, Transmissions), Nervous system, Analysis, Nerve cells, Models (Simulations), Propagation, Electrical properties, Potassium, Sodium.

Neuristor is the name assigned to the class of devices that exhibits attenuationless signal propagation, as in the attenuationless propagation of a burning zone along a simple chemical fuse, or the attenuationless propagation of an electrical discharge along the axon of a nerve fiber. Early studies have shown that totally distributed electronic lines can be realized that exhibit similar propagation properties; futhermore, many different types of lines can be realized, each characterized by different forms of mathematical systems. This report reviews an analysis of nerve transmission from which excellent electrical models and equation forms are derived. A result of the study has been the realization that the propagation along the axon of a nerve fiber, and that along a (conceptually) rechargeable fuse appear to be fundamentally different, although their terminal properties are identical. (Author)

AD-415 208 Div. 16
(TISTB/WA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
THE PROTECTIVE EFFECTS OF PRETREATMENT WITH

ADRENOCORTICOTROPHIC HORMONE IN TRAUMATIC SHOCK.
May 63, 3p. Technical documentary rept. no. 63 10
Task 775601
SAM B TDR63 10
Unclassified report

Descriptors: (*Shock (Pathology), Protective treatments), (*Adrenocorticotropic hormone), Blood pressure, Low temperature research, Vasoactive agents, Physiology, Medical research.

Adrenocorticotrophic hormone (ACTH) was given to rats prior to subjecting them to a measured, severe, surfical trauma. Pretreated animals were able to maintain their systolic blood pressure at normal levels while untreated animals showed marked hypotension at the conclusion of the trauma. Animals which were stressed by being subjected to a cold environment (3 to 5 C) for one week before trauma and pretreated with ACTH showed no difference in mean systolic blood pressure from untreated stressed controls. Pretreatment with ACTH has a definite vasopressor effect in previously eucorticoid animals. (Author)

AD-415 217 Div. 16
(TISTB/WA) OTS price $2.60

Stanford U., School of Medicine, Calif.
SPEECH DISCRIMINATION OF HEARING-IMPAIRED INDIVIDUALS IN NOISE: ITS RELATIONSHIP TO OTHER AUDIOMETRIC PARAMETERS,
by Mark Ross, Dorothy A. Huntington, Hayes A. Newby and Richard F. Dixon. Apr 63, 25p.
Contract AF41 657 376, Task 775503
SAM TDR62 130 Unclassified report

Descriptors: (*Audiometry, Speech), Distortion, Noise, Hearing, Tests, Pathology, Correlation techniques, Audiofrequency.

This study evaluated the relationships of speech discrimination measures obtained in quiet and in noise with various distortion indexes with a group of subjects with sensorineural hearing loss. The results indicated that the most important factors associated with speech intelligibility were the extent and configuration of the hearing loss. The interrelationships among DL tests for frequency and intensity, linear range measures, age, and pure-tone thresholds were examined. Comparisons were made with normal-hearing listeners. (Author)

AD-415 273 Div. 16
(TISTB/WA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
PAROTID FLUID STEROID RESPONSES TO GRADED DOSES OF CORTICOTROPIN,
by Ira L. Shannon, John R. Prigmore and William A. Gibson. May 63, 3p.
Task 775602
SAM B TDR63 30 Unclassified report

Descriptors: (*Corticosteroid agents, Secretion), (*Saliva), Adrenocorticotropic hormone, Physiology, Urine.

Paroitid fluid and urine 17-hydroxycorticosteroid (17-OHCS) measurements were carried out in 90 systemically healthy young adult males who received graded intramuscular doses of ACTH. The administration of 20, 30, and 40 units of ACTH produced significant increases in parotid fluid free 17-OHCS levels 2 hours after dosage. The 17-OHDS levels in parotid fluid following 5 and 10 units of ACTH did not differ significantly from those for the control group. The total 17-OHCS excretion rates in urine over the 6-hour experimental period showed a steady increase with the increase in dose levels. These findings strengthen the premise that parotid fluid steroid measurements may be employed in evaluating human adrenocortical status. (Author)

AD-415 373 Div. 16
(TISTB/WA) OTS price $2.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
IMPORTANCE OF STOMACH AND OTHER EXTRATHYROIDAL, EXTRARENAL AVENUES OF IODIDE LOSS DURING THYROID UPTAKE TESTS,
by William P. Fife. June 63, 20p.
SAM/B Review 6 63 Unclassified report

Descriptors: (*Thyroid gland, Metabolism), (*Metabolism, Iodide), Stomach, Kidney, Inhibition, Biosynthesis, Secretion, Skin, Salivary glands, Physiology, Tracer studies.

The results of the study show that although the thyroid gland and the kidneys usually are considered the two main organs in direct competition for blood iodide, actually there are at least seven other organs, each of which, during the first 2 hours after iodide administration, may remove more iodide than does the thyroid gland itself. Even at the end of 18 hours, the thyroid gland may accumulate only 20% of the radioactive iodide found in the body at that time. Thyroid uptake tests employing radioactive iodide may be grossly influenced by the stomach, which normally accumulates iodide actively at a high organ/blood gradient. Under certain conditions such as vomiting or aspiration, this may result in removal of an exceedingly large amount of the iodide test dose before it can be accumulated by the thyroid gland. Under other conditions, such as in achlorhydria or gastrectomy, it may hold little iodide, resulting in blood concentrations of iodide remaining higher than normal, thus permitting the thyroid to remove more iodide than normally. Any combination of these conditions probably would seriously influence thyroid uptake studies. (Author)

AD-415 406 Div. 16
(TISTB/AAR) OTS price $3.60

Technical Library Camp Detrick, Frederick, Md.
ROCKY MOUNTAIN SPOTTED FEVER GROUP OF RICKETTSIOSES. BIBLIOGRAPHY,
by David G. Coonan. 1950, 34p.
Unclassified report

Suppl. to AD-294 882.

Descriptors: (*Bibliographies, Rickettsia), (*Ricettsia, Diseases), Bacteria, Microorganisms.

AD-415 415 Div. 16
(TISTB/AAR) OTS price $5.60

Resources Research Inc., Washington, D. C.
RAPID MICROBIOLOGICAL DETECTION.
Final rept.
30 Apr 63, 53p.
Contract N178 8054, Proj N178 8097
Unclassified report

Descriptors: (*Microorganisms, Detection), Bacillus subtilis, Bacteria, Feasibility studies, Adenosine phosphates, Oscilloscopes, Cells (Biology), Streptomyces, Fungi, Spores, Yeasts, Growth, Biochemistry.

The feasibility of detecting microorganisms rapidly by measuring light emitted when they are introduced into an ATP-dependent firefly luminescence reaction has been established. Instrumentation, consisting basically of a reaction chamber, a photomultiplier system, and an oscilloscope with camera attachment, has been assembled in a manner which permits the observation and recording of the reaction produced by quantities of ATP as low as 2 x 1/10,000 ug. Nearly instantaneous, positive responses have been obtained from 16 different microorganisms which included bacteria, yeast, and streptomycetes. Similarly rapid responses have also been obtained from lyophilized bacteria, a commercial preparation of dried yeast, fungus spores, and a soil extract. Bacterial cells in lag phase responded as readily as those in exponential growth. Yeast cells grown for two weeks responded in the same manner as younger cells. Cultures older than two weeks were not tested. A response was obtained from Bacillus subtilis spores when tested after 90 minutes of incubation in a growth medium. Dead cells did not yield a positive response. (Author)

AD-415 416 Div. 16
(TISTB/AAR) OTS price $3.60

Resources Research Inc., Washington, D. C.
RAPID MICROBIOLOGICAL DETECTION.
Quarterly rept. no. 1, 1 May-31 July 63.
7 Aug 63, 34p.
Contract N178 8097
Unclassified report

Descriptors: (*Microorganisms, Detection), (*Biological assay, Adenosine phosphates), Purification, Enzymes, Escherichia, Bacteria, Microorganisms, Algae, Luminescence, Algae.

A new tchnique for the bioassay of ATP was developed in which the reaction is allowed to take place on filter paper. A major advantage of this technique is that it allows a rapid concentration of dilute ATP. A similar method which employs glass plates instead of filter paper is under development. Studies were carried out with partially purified preparations of luciferase and luciferin in an effort to understand, and possibly eliminate the inherent light effect. While the mechanism of the inherent light effect is not yet defined, it appears that an initial 'one step' treatment with calcium phosphate gel eliminates a major part of the inherent light without affecting the enzyme activity to any great extent. The extraction of ATP from E. coli and S. ceravisiae using different solvents is now being studied. Using extraction with hot water as the basis of comparison, perchloric acid was not as effective while acetone when mixed with water at a ten to one ratio effected a significantly better extraction. Detection of 3,800 yeast cells has been realized. By using methanol extraction it has been possible to obtain a positive response from algae. (Author)

AD-415 462 Div. 16
(TISTB/WA) OTS price $1.10

Pennsylvania State U., University Park.
(No title).
Research rept.,
by E. S. Lindstrom. 1 Jan 61. 3p.
Grant AF AFOSR 61 42
AFOSR 4998 Unclassified report

Descriptors: (*Plants (Botany), Physiology), Abstracts, Metabolism, Photosynthesis, Enzymes, Bibliographies, Pigments.

AD-415 464 Div. 16
(TISTB/WA) OTS price $5.60

Max-Planck-Institut (Germany).
THE ENZYMATIC DEGRADATION OF TERPENES.
Final technical rept.,
by W. Seubert, U. Remberger, E. Fass and H. Hubner. 14 Dec 62, 53p.
Contract AF61 052 251
AFOSR Rept. no. 4905 Unclassified report

Descriptors: (*Enzymes, Degradation), (*Bacterial extracts, Enzymes), Physiology, Oxidation, Pseudomonas, Chemical reactions, Coenzymes, Labeled substances, Chromatographic analysis.

Pyruvate carboxylase employed in these studies has been purified 550 times from crude extracts of Ps. citronellolis. The enzyme catalyzes the ATP and Mg++- dependant carboxylation of pyruvate to oxalacetate. Biotin acts as the prosthetic group of the enzyme. By exchange studies with radioactive compounds a CO_2-biotin-enzyme has been shown to participate in the carboxylation of pyruvate. In contrast to the mammalian pyruvate carboxylase the enzyme isolated from bacteria catalyzes the above reaction in the absence of acetyl CoA. The implication of this observation regarding possible different carboxylation mechanisms in bacterial and mammalian systems is discussed. (Author)

AD-415 479 Div. 16
(TISTB/WA) OTS price $1.10

Harvard Coll. President and Fellows, Cambridge, Mass.
HYPOTHALAMIC SECRETORY FACTOR FOR ADRENOCORTICOTROPIC HORMONE (SF-ACTH).
Final Technical rept.,
by Paul L. Munson. 16 Jan 63, 8p.
Contract AF49 638 740
AFOSR 4902 Unclassified report

Descriptors: (*Tissue extract, Biological assay), (*Biological assay, Tissue extract), (*Thalamus, Secretion), Adrenal glands, Ascorbic acid, Adrenocorticotropic hormone, Purification, Rats.

Research on the biological assay and purification of the hypothalamic secretory factor for ACTH (HSF-ACTH) has been described. Extracts of hypothalamic tissue are evaluated by testing for decrease in adrenal ascorbic acid (as an indicator of endogenous or exogenous ACTH) in three types of rats. Rats anesthetized with pentobarbital are used to estimate proper dose levels and to detect nonspecific stressful contaminants. Rats anesthetized with pentobarbital and treated with morphine, which do not respond to moderate stimulation by nonspecific substances, are used to estimate the amount of HSF-ACTH, but they also respond to ACTH. Hypophysectomized rats are used to estimate the amount of exogenous ACTH that may contaminate the HSF-ACTH preparations. (Author)

17. METALLURGY

AD-414 112 Div. 17, 4
(TISTM/AMS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CORROSION STUDY V. MECHANISM OF CHEMICAL PASSIVATION AND CORROSION OF METALS,
by M. Prazak and V. Prazak. 2 July 63, 13p.
FTD TT62 1721 Unclassified report

Trans. from Sbornik Chekoslovak Khimii Rabot, 21, pp. 564-570, 1956.

Descriptors: (*Iron, Corrosion), (*Corrosion, Iron), (*Polarization, Iron), Electrochemistry, Oxidation-reduction reactions, Chemistry, Nitric acid, Oxidation, Metals.

The progress of the chemical and electrochemical passivation and corrosion of iron in nitric acid of varying concentration was compared. The oxidation and reduction processes in these reactions were expressed with the aid of partial currents, the dependence of which was measured on the one hand, for the electrode potential for the anodic dissolving process of the iron and, on the other hand, for the cathodic reduction of the nitric acid but separated in the form of a polarization curve. A diagram was set up by means of which the corrosion behavior or iron in nitric acid of a given concentration can be read. The results obtained showed that between the mechanism of the chemical and electrochemical corrosion reactions, a marked difference does not exist. The progress of the chemical corrosion reactions can be described quantitatively with the aid of partial currents, i. e., electrochemical relationships. (Author)

AD-414 164 Div. 17, 25
(TISTM/AM) OTS price $8.10

Electro-Optical Systems Inc., Pasadena, Calif.
RESEARCH ON CESIUM VAPOR.
Annual rept., 1 May 62-1 May 63,
by A. O. Jensen. 14 June 63, EOS Rept. 3130
Contract Nonr380500
Unclassified report

Descriptors: (*Cesium, Vapors), (*Resonance absorption, Measurements), Plasma sheath, Ionization, Theory, Thermimic converters, Atomic energy levels, High temperature research, Ionization potential, Gases, Absorption spectrum, Pressure, Test equipment, Test method, Emissivity, Refractory metals and alloys, Soldering alloys, Brazing.

The results of an investigation into the absorption of resonance radiation in cesium vapor and the effect of resonance radiation on the ionization processes in cesium vapor plasmas are reported. A model for the dominant ionization processes in cesium vapor plasmas are reported. A model for the dominant ionization processes is proposed that appears to be applicable to the cesium pressure range and other conditions found in cesium vapor thermionic converters. It has been found that the atomic resonance absorption bandwidths at the 8521 Angstroms and 8943 Angstroms resonance lines are much greater than previously reported. A molecular absorption band near 7600 Angstroms was also observed which can contribute significantly to the energy input to a cesium vapor plasma. At high cesium pressure (greater than 0.3 mm Hg) and emitter temperatures (greater than 1800 K) the absorption of resonance radiation may be the most significant energy input into a cesium vapor thermionic converter plasma leading to the formation of the cesium molecular ion as the dominant ionic species in the plasma according to the relationship:

$Cs^* + Cs^*$ (heat of formation Cs_2) $\rightarrow Cs_2^+ + e$.

(Author)

AD-414 172 Div. 17, 26
(TISTM/AMS) OTS price $1.10

Aeronautical Materials Lab., Naval Air Engineering Center, Philadelphia, Pa.
ELECTRON BEAM WELDING OF REFRACTORY METALS,
by Edward F. Deesing. 9 Aug 63, 3p.
NAEC AML1725
Unclassified report

Descriptors: (*Refractory metals and alloys, Welding), (*Welding, Refractory metals and alloys), Titanium alloys, Molybdenum alloys, Sheets, Tensile properties, Welds.

AD-414 194 Div. 17, 25
(TISTM/BRW) OTS price $1.00

Cincinnati U., Ohio.
RELATION BETWEEN SPECIFIC HEAT AND EMISSIVITY OF TANTALUM AT ELEVATED TEMPERATURES.
Final rept., July 61-Dec 62,
by Michael Hoch and H. V. L. Narasimhamurty.
July 62, 31p.
Contract AF33 616 7123, Proj. 7367, Task 736704
ASD TDR63 371 Unclassified report

Descriptors: (*Refractory metals and alloys, Tantalum), (*Tantalum, Emissivity), Specific heat, Measurement, High temperature research, Experimental data, Tables.

The rate of cooling in vacuum of tantalum cylinders of various sizes has been studied in the temperature range 1850 to 1300 K. The ratio of specific heat, C sub p, to total emissivity, epsilon, was found to be constant: C sub p/epsilon = 0.226 ± 0.004 cal/gm/degree K. (Author)

AD-414 205 Div. 17, 25, 4
(TISTM/AMS) OTS price $1.10

Catholic U. of America, Washington, D. C.
THE TRANSMISSION OF HYDROGEN THROUGH PALLADIUM,
by Gilbert W. Castellan. 4 Jan 63, 2p.
Contract AF49 638 475
AFOSR 4937 Unclassified report

Descriptors: (*Palladium, Hydrogen), (*Hydrogen, Palladium), Atoms, Gases, Diffusion, Solubility, Transport properties, Electrodes, Fuel cells.

AD-414 377 Div. 17
(TISTM/BRW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INVESTIGATION DIFFUSION MOBILITY OF ZIRCONIUM IN ZIRCONIUM-NIOBIUM ALLOYS,
by G. G. Ryabova and P. L. Gruzin. 31 May 63, 8p.
FTD TT63 258 Unclassified report

Trans. from Metallurgiya I Metallovedeniye Chistykh Metallov, Inzhenerno-Fizicheskoy Institut, Trudy Nr. 3, Moskva, pp. 120-126, 1961.

Descriptors: (*Zirconium, Diffusion), (*Niobium, Diffusion), (*Diffusion, Tracer studies), Zirconium alloys, Niobium alloys, Isotopes, Heat treatment, Temperature, Time, Heat of activation.

AD-414 490 Div. 17
(TISTM/BRW) OTS price $1.60

Brush Beryllium Co., Cleveland, Ohio.
DEVELOPMENT OF FINE DIAMETER HIGH-PURITY WIRE FROM ZONE-REFINED BERYLLIUM.
Final rept. Jan 63,
by A. G. Gross, Jr. and R. G. O'Rourke. Jan 63, 11p. TR299 236
Contract NOw62 0067c
Unclassified report

Descriptors: (*Beryllium, Wire), (*Wire, Mechanical properties), Tensile properties, Ductility, Zone melting, Drawing (Machine processing), Hardening, Strain (Mechanics), Crystals, Single crystals.

Wires from zone-refined crystal D were tensile tested at room temperature. These wires were tested in the as-drawn-with-lubricant condition. Tensile properties of the wire from crystal D were determined as a function of wire-drawing strain. It was found that, on the average, the zone-refined beryllium work-hardened at about the same rate as did commercially-pure beryllium. The room temperature strength level of the zone-refined material was about half that of the commercially-pure wire. Room temperature ductility in the as-drawn condition was not very purity-sensitive. (Author)

AD-414 497 Div. 17
(TISTM/AM) OTS price $1.60

Westinghouse Electric Corp., Blairsville, Pa.
PROCESSING AND EVALUATION OF PRE-PRODUCTION QUANTITIES OF COLUMBIUM ALLOY SHEET.
Interim rept. no. 2, 24 Apr-23 July 63.
20 Aug 63, 14p.
Contract N600 19 59546
Unclassified report

Descriptors: (*Niobium alloys, Rolling), Hot working, Cold working, Surfaces, Chemical analysis, Heat treatment, Recrystallization, Sheets, Processing.

The 0.155-inch B-66 sheet processed in the preceding report period was further processed to final gage, 0.050 inch. The yield of 46.4% from extrusion billet compares favorably with yields for other columbium alloys which are generally less difficult to fabricate. Sheet flatness was excellent and was 3.1% maximum. Gage uniformity was good, and AMS specifications were generally met; additional work is indicated to produce 1/2 AMS tolerances in the alloy. The FS-85 ingot, 6 3/8-inches in diameter and weighing 303 pounds, was readily forged to 2 5/8-inch thick slab and a high yield of material is expected from this operation. (Author)

AD-414 673 Div. 17
(TISTM/AM) OTS price $4.60

General Electric Co., Santa Barbara, Calif.
STUDY OF STRESSES NEAR A DISCONTINUITY IN A FILAMENT-REINFORCED COMPOSITE METAL.
by Norris F. Dow. Aug 63, 49p. Rept. no. R63SD61
Contract NOw 60
Unclassified report

Descriptors: (*Stresses, Composite materials), (*Composite materials, Metals), Reinforcing materials, Binders, Shear stresses, Equations, Aluminum, Aluminum compounds, Oxides, Plasticity, Theory, Strain (Mechanics).

A study is made of stresses in the vicinity of discontinuities in filaments in filament-reinforced, composite materials. Formulas are derived for the calculation of local stresses in filament or binder, and for the shear stresses induced between them. Sample calculations (in both elastic and plastic stress ranges) show that disturbances from the general stress level are primarily local, near the discontinuity, and particularly that the shear stress between fiber and binder is apt to rise to a high peak value at the discontinuity. The magnitude of this peak is shown to be governed by a parameter, defined in the report, which also governs the length of filament required to approach infinite length in effectiveness. Thus any attempts to reduce the shear stress, as by permitting yielding of the binder, will also increase the filament length required for effective reinforcement. The conclusion is reached that the accommodation of the high peak shear stresses at discontinuities may well be the crux of the attainment of the potentials apparently available with high-strength filaments or ''whiskers'' as reinforcements for composite materials. (Author)

AD-414 806 Div. 17
(TISTM/AMS) OTS price $.50

Naval Research Lab., Washington, D. C.
EFFECT OF VACUUM ON THE CREEP-RUPTURE PROPERTIES OF SINTERED ALUMINUM AND COMMERCIAL ALUMINUM,
by M. R. Achter and P. Shahinian. 1 July 63, 14p.
NRL Rept. no. 5948 Unclassified report

Descriptors: (*Aluminum, Creep), (*Creep, Aluminum), Sintering, Rupture, Vacuum, Porosity, Dispersion hardening, Grain boundaries, Hydrogen, High temperature research, Fracture (Mechanics), Oxidation, Gases, Adsorption, Controlled atmospheres, Experimental data, Microstructure, Pressure.

In an investigation of the effect of environment on creep-rupture properties, it has been found that vacuum increases the life of sintered aluminum and improves the ductility of commercial purity aluminum at 400, 500, and 600 C. Metallographic studies show that the environemtnal effects can be related to the appearance of porosity in the dispersion-hardened material and grain boundary fissures in the unmodified aluminum. It is concluded that the improvements conferred by the vacuum environment are a result of its control of the hydrogen content of both materials. (Author)

AD-414 823 Div. 17
(TISTM/AMS) OTS price $.50

Naval Research Lab., Washington, D. C.
THE EFFECT OF A FATIGUE CRACK ON THE NOTCH STRENGTH AND FRACTURE DEVELOPMENT IN CYLINDRICAL SPECIMENS OF HEAT-TREATED 4340 STEEL,
by E. P. Klier. 24 June 63, 13p.
NRL Rept. 5914 Unclassified report

Descriptors: (*Steel, Fracture (Mechanics)), Fatigue (Mechanics), Tensile properties, Transition temperature, Ductility, Brittleness, Fractography, Tests, Experimental data, Temperature.

It is important to know the effect of a fatigue notch on the notch strength of a steel, which in the present work was a 4340 steel heat-treated to characteristic strength levels. Fatigue-cracked specimens for the various heat-treated conditions were tested in static tension at

temperatures from 75 to -323 F to establish notch-strength transitions. The notch strengths measured with the fatigue-cracked specimens demonstrate that the notch formed in fatigue is more severe than the sharpest machined notches. The ductile-brittle transition measured with 0.5-inch cyylindrical fatigue-cracked specimens occurs at higher temperatures than that for comparable 1.5-inch cylindrical specimens with the sharpest machined notches. The fatigue-notch tension data yield fracture indices of brittle behavior which parallel but which are not equal to the NDT index measured in the droop-weight tests reported by Puzak. (Author)

AD-414 829 Div. 17
(TISTM/BRW) OTS price $4.60

Climax Molybdenum Co. of Michigan, Detroit.
RESEARCH AND DEVELOPMENT ON NEW PROCESSES OF PRODUCING DUCTILE MOLYBDENUM,
Progress rept., 1 Nov 61-31 July 62,
by A. Phillip Coldren, William G. Scholz and M. Semchyshen. 31 Aug 62, 37p.
Contract NOrd15915

Unclassified report

Descriptors: (*Molybdenum, Purification), (*Solids, Refining (Metallurgy)), Refractory metals and alloys, Deoxidation (Metallurgy), Carbon, Oxygen, Hydrogen, Ductility, Controlled atmospheres, Hardness, Brittleness, Transition temperature, Microstructure, Vacuum furnaces, Low pressure research.

An investigation was made to determine the practical limits of solid-state purification of unalloyed molybdenum. It was found that by using low-pressure, flowing atmospheres of tank oxygen for decarburization and palladium-diffused hydrogen for deoxidation, that (1) the carbon content was reduced to 0.003% from 0.019% by weight, (2) minor phases were eliminated from the microstructure, as judged by observations at X2000, (3) the room-temperature hardness was lowered to 158.5 DPH from 168.1 DPH (30 kg load), and (4) the 120 degree-bend transition temperature was raised slightly, from 365 F up to 390 F. (Author)

AD-414 929 Div. 17
(TISTM/AM) OTS price $1.10

Ohio State U. Research Foundation, Columbus.
SIZE EFFECT IN POLYCRYSTALLINE INDIUM PLATES IN A MAGNETIC FIELD,
by P. Cotti, J. L. Olsen, J. G. Daunt, and M. Kreitman. Aug 63, 5p. Technical rept. no. 9
Contract Nonr49520, RF Proj. 989; NR018 412

Unclassified report

Descriptors: (*Indium, Resistivity (Electrical), Magnetic fields, Measurement.

AD-414 937 Div. 17
(TISTM/AMS) OTS price $1.10

Keck, W. M., Lab. of Engineering Materials, Calif. Inst. of Tech., Pasadena.
CsCl - TYPE COMPOUNDS IN BINARY ALLOYS OF RARE EARTH METALS WITH ZINC AND COPPER,
by C. C. Chao, H. L. Luo, and P. Duwez. July 63, 5p. Technical rept. no. 17
Contract Nonr22030

Unclassified report

Descriptors: (*Copper alloys, Rare earth elements), (*Zinc alloys, Rare earth elements), Cesium compounds, Chlorides, Neodymium alloys, Gadolinium alloys, Yttrium, Neodymium, Samarium, Gadolinium, Terbium, Dysprosium, Holmium, Erbium, Thulium, Crystal lattices, X-ray diffraction analysis.

Compounds of equiatomic composition of Cu with Sm, Tb, Dy, Ho, Tm and of Zn with Y, Nd, Sm, Gd, Tb, Dy, Ho, Er, and Tm were found to crystallize into the CsCl (B2 - type) structure. The lattice parameters of these compounds vary linearly with the trivalent ionic radii of the rare earth elements. (Author)

AD-414 938 Div. 17
(TISTM/AMS) OTS price $1.10

Aerojet-General Corp., Azusa, Calif.
INVESTIGATION OF STRESS-CORROSION CRACKING OF HIGH STRENGTH STEELS.
Informal monthly rept. no. 21, 1-31 July 63,
by W. L. Bruckart. 31 July 63, 3p. Rept. no. 0414 02 01
Contract DA04 495ORD3069

Unclassified report

Descriptors: (*Steel, Corrosion), (*Stresses, Corrosion), (*Corrosion, Steel), Tool steel, Nickel alloys.

AD-414 980 Div. 17
(TISTM/BRW) OTS price $2.60

United Aircraft Corp., East Hartford, Conn.
ANALYTICAL AND EXPERIMENTAL INVESTIGATIONS OF THE FRACTURE -- MECHANISMS OF CONTROLLED POLYPHASE ALLOYS.
Quarterly progress rept. no. 3, 30 Apr-29 July 63,
by J. A. Ford. 31 Aug 63, 23p. B910068 3
Contract N6001959361

Unclassified report

Descriptors: (*Alloys, Fracture (Mechanics)), (*Fracture (Mechanics), Alloys), Eutectics, Copper alloys, Chromium alloys, Aluminum alloys, Nickel alloys, Metallic crystals, Fractography, Tensile properties, Shear stresses, Grain structures (Metallurgy), Crystal substructure, Fibers, Microstructure, Stresses, Strain (Mechanics), Elasticity.

The results of continued investigations of the unidirectionally solidified eutectic alloys Cu-Cr, Al-CuAl2, and Al-Al3Ni are presented. Microbend tests were made on Al-CuAl2 eutectic specimens for the 30, 45, and 60 deg plate orientations to complete the plate orientation-stress axis study. The results indicate a nonlinear decrease in strength from a maximum of 49,800 psi for the parallel case (zero degrees orientation) to a minimum of 16,700 psi for the normal case (90 deg orientation). The composite elastic modulus has been determined graphically to be about 14.5 x 10 to the 6th power psi (depending upon phase-stress axis orientation). (Author)

AD-415 028 Div. 17
(TISTM/AM) OTS price $1.60

Goodyear Tire and Rubber Co., Akron, Ohio.
STUDY OF THE EFFECTS OF MECHANICAL DAMAGE ON THE

PERFORMANCE OF FILAMENT-WOUND MOTOR CASES.
Progress rept. no. 2, 1 June31 July 63,
by R. A. Burkley, T. J. Boller, and I. R. Butcher. 20 Aug 63, 13p. Rept. no. GER11154A
Contract NOw63 0449c FBM
Unclassified report

Descriptors: (*Filament wound construction, Rocket cases), Guided missiles (Underwater to surface), Guided missiles (Surface to surface), Stresses, Failures (Mechanics, Tables, Quality control, Hydrostatic pressure, Surfaces, Cutting tools, Abrasives, Tests, Pressure vessels.

This interim technical progress report discusses the work performed by Goodyear Aerospace Corporation under Navy Bureau of Weapons Contract NOw 63-0449-c (FBM) from 1 June through 31 July 1963. This report discusses the fabrication, machine flawing, and testing of six-inch diameter filament-wound bottles. The objectives of the study program under this contract are to study the effects of surface flaws on the performance of Polaris motor cases, to compare the effect of winding sequence on the ability to resist failure from surface flaws, and to determine the reliability of various repair techniques. (Author)

AD-415 030 Div. 17
(TISTM/AM) OTS price $5.60

Fritz Engineering Lab., Lehigh U., Bethlehem, Pa
THE INFLUENCE OF THE ADJACENT SPANS ON THE ROTATION CAPACITY OF BEAMS,
by J. Prasad and T. V. Galambos. June 63, 50p. Rept. no. 205H12
Contract Nonr61003
Unclassified report

Report on Welded Continuous Frames and Their Components.

Descriptors: (*Beams (Structural), Buckling), Steel, Moments, Deformation, Loading (Mechanics), Test methods, Equations, Test equipment, Strain gage, Tables, Data.

This report contains a description of four experiments on wide flange beams in which the yielded zone extended over three unbraced fields. These experiments were performed to determine the post-buckling strength of beams in which the spans adjacent to the critical segment were fully yielded. It was found that for the same unbraced length, beams with completely yielded adjacent spans delivered only about 30% of the rotation capacity of beams with elastic adjacent spans. For effective unbraced lengths of 40r sub y or more, failure was due to lateral-torsional buckling while for shorter beams failure occurred by local buckling. (Author)

AD-415 055 Div. 17
(TISTM/BRW) OTS price $1.10

New England Materials Lab. Inc., Medford, Mass.
DISPERSION STRENGTHENED NICKEL-BASE ALLOYS.
Progress rept. no. 1, 1 Mar-30 Apr 63,
by A. S. Bufferd, R. C. Nelson and N. J. Grant. 15 May 63, 5p.
Contract N600 19 59891
AEC NP12793 Unclassified report

Descriptors: (*Nickel alloys, Dispersion hardening), (Powder metallurgy, Nickel alloys), Chromium alloys, Thorium compounds, Oxides, Extrusion, Mechanical properties, Microstructure, High temperature research, Particle size.

Dispersion strengthened nickel-base alloys (80% nickel - 20% chromium) were prepared by the mechanical mixing of Nichrome and thorium oxide powders. Extruded bar stock was prepared by powder metallurgical techniques and is presently being evaluated with respect to mechanical properties and microstructure. (Author)

AD-415 203 Div. 17, 26
(TISTM/BRW) OTS price $.75

Defense Metals Information Center, Columbus, Ohio.
WELDABILITY STUDIES OF THREE COMMERCIAL COLUMBIUM-BASE ALLOYS,
by P. A. Kammer and R. E. Monroe. 17 June 63, 19p. Memo no. 169
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Refractory metals and alloys, Thermal joining), (*Niobium alloys, Welding), (*Welds, Mechanical properties), Tantalum alloys, Tungsten alloys, Zirconium alloys, Molybdenum alloys, Vanadium alloys, Hafnium alloys, Sheets, Arc welding, Controlled atmospheres, Hardness, Ductility, Surface properties, Microstructure.

A group of niobium-base alloys is being considered for addition to the Department of Defense Refractory Metals Sheet Rolling Program. Good weldability is one of the requirements. Two alloys under consideration are B-66, and FS-85. A third alloy, C-129 was also included in this evaluation. Samples of these three alloys were obtained for a brief weldability evaluation to determine whether the alloys met the target properties established by the Materials Advisory Board, Refractory Metals Sheet Rolling Panel-Alloy Requirements and Selection Group. Bend tests made on base-metal samples showed that all alloys met the target properties for base metal. Bend tests of welds made in a vacuum-purged controlled-atmosphere chamber showed that only the welds in the FS-85 alloy possessed the desired target properties. (Author)

AD-415 331 Div. 17
(TISTM/AMS) OTS price $5.60

Hughes Aircraft Co., Culver City, Calif.
CADMIUM TELLURIDE DATA SHEETS,
by M. Neuberger. June 62, 49p. Rept. no. DS101
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Cadmium alloys, Tellurium alloys), (*Tellurium alloys, Cadmium alloys), Semiconductors, Data, Absorption, Dielectric properties, Electrical conductance, Hall effect, Radiation damage, Magnetic properties, Photoconductivity, Reflection, Refractive index, Resistance (Electrical), Thermoelectricity.

18. MILITARY SCIENCES AND OPERATIONS

AD-414 325 Div. 18
(TISTB/AAR) OTS price $1.60

Martin Marietta Corp., Denver, Colo.
BIDDER COST ESTIMATES AS A DATA BASE SOURCE FOR ADVANCED SYSTEMS COSTING,
by M. V. Jones. July 63, 8p. Rept. no. TM3538
Contract AF19 628 2390, Proj. 850
ESD TDR63 251
Unclassified report

Descriptors: (*Military organizations, Costs), Selection, Data processing systems, Effectiveness, Acceptability.

This paper proposes that bidder cost estimates received in the course of a system source selection be included in the data base for costing advanced military systems. The paper discusses the advantages of bidder cost estimates as a data base source, suggests some precautions that should be observed in using these estimates, recommends standards necessary for their most effective utilization, and identifies the types of cost estimating data that might be derived from bidder cost estimates. (Author)

AD-414 533 Div. 18
(TISTB/CCH) OTS price $1.60

General Dynamics Electronics, San Diego, Calif.
WEAPON SYSTEM WS-107A-2 PROGRAM PROGRESS AND SECURITY REPORT. APPENDIX IV TO EXHIBIT A.
July 63, 15p.
Contract AF04 647 463
Unclassified report

Status Rept., Bureau of Budget Approval.

Descriptors: (*Weapons systems, Scientific research), (*Military engineering, Weapons systems), Human engineering, Maintenance.

AD-414 665 Div. 18, 12
(TISTA/GEC) OTS price $10.10

San Francisco State Coll., Calif.
SPACE EXPLORATION AND INTERNATIONAL PROBLEMS IN THE USE AND CONTROL OF OUTER SPACE.
by Edward Harold Curtis. July 63, 117p.
Unclassified report

Thesis submitted for Master of Arts Degree.

Descriptors: (*Space probes, Political science), (*Space flight, Political science), Operations research, Control, Theory, Exploration.

The international problems involved in the use and control of outer space are studied. An analysis is made of the United Nations Committee findings on the Peaceful Uses of Outer Space. (Author)

AD-415 040 Div. 18
(TISTB/JAB) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
PLANNING FOR SHELTER USE IN SAN DIEGO.
by Edwin E. Boughton, Frederick D. Witzel and Nicholas A. Rosa. June 63, 50p.
Contract OCD OS62 135, Proj. IMU4021
Unclassified report

Descriptors: (*Shelters, Civil defense systems), Management engineering, Personnel management, Medical personnel.

AD-415 338 Div. 18
(TISTB/CCH) OTS price $9.10

George Washington U., Washington, D. C.
SURVEY OF COMMAND LOGISTICS PROBLEMS.
30 July 63, 1v. Serial T161
Contracts Nonr761 03 and Nonr76105, Projs. NR345 107 and NR047 001
Unclassified report

Descriptors: (*Logistics, Command and control systems), (*Command and control, Logistics), Military strategy, Tactical warfare, Bibliographies, Operations research, Tables, Mathematical analysis.

Various Command and Control Systems now under development are intended to permit maximum responsiveness by the Navy to any military plan or contingency. A survey of command logistic problem areas in the context of the Command and Control Systems environment was made in some detail. Maximum responsiveness by the Navy to any military plan or contingency is to be achieved by the Command and Control Systems now under development. The development of techniques for logistics planing and operations under the Command and Control Systems environment has not kept pace with the operational and organizational development of the systems. A survey of command logistic problems in the context of the Command and Control System environment has been made in some detail and seven specific problem areas requiring major research effort have been described. Reference to current research efforts in these areas has also been made. (Author)

19. NAVIGATION

AD-414 573 Div. 19, 8, 6
(TISTE/CAM) OTS price $7.60

Hazletine Technical Development Center Inc., Indianapolis, Ind.
GENERAL AVIATION TRANSPONDER.
Final engineering rept.
30 Oct 62, 68p. 6103
Contract FAA BRD233, Proj. 108 8D
Unclassified report

Descriptors: (*Transponders, Airport radar systems), Transmitter-receivers, Theory, Operation, Coding, Modulators, Power supplies, Packaged circuits, Electronic equipment, Video networks, Test methods.

Research is presented on the design and development of the General Aviation Transponder (GAT). Included are descriptions of the operation of the unit and an account of the engineering difficulties incurred, together with illustrations of the GAT system and unit schematics. (Author)

AD-415 044 Div. 19, 8
(TISTE/JBM) OTS price $3.60

ITT Federal Labs., Nutley, N. J.
TACAN SOLID STATE ELECTRONIC KEYER.
Final engineering rept. no. 2.
Jan 63, 35p.
Contract AF19 604 8811
ESD TDR63 340
Unclassified report

Descriptors: (*Radio navigation, Pulse generators), (*Pulse generators, Radio navigation), Modules (Electronics), Encapsulation, Ultrahigh frequency, Temperature, Stability, Coding, Maintainability, Solid state physics, Reliability (Electronics), Direct current, Operation, Mechanical drawings, Circuits, Transistors, Timing circuits, Switching circuits, Relaxation oscillators.

An engineering model of the TACAN soli state keyer was fabricated for Tacan and similar navi-

gational aid equipments. The engineering model was to incorporate changes necessary to assure operation of the keyre, within specified tolerances, over the range of -40 degrees Centrigrade to +80 degrees Centigrade. The code character timing requirement was changed to 0.1 second for the dot, 0.3 seconds for the dash, 0.1 second for the space between dots and dashes, and 0.3 seconds for the space between consecutive characters of a code group. The engineering model of the solid state electronic keyer is compatible with existing equipments and has definite advantages in reliability, coded-output setup procedure, flexibility with respect to application in future equipments, and potential size reduction. Maintenance is considerably reduced since periodic servicing and adjustment is not required. (Author)

AD-415 112 Div. 19
(TISTB/WA) OTS price $1.10

California Academy of Sciences, San Francisco.
(No title).
Final rept.,
by William J. Hamilton, III. 1962, 5p.

Grants AF AFOSR62 281 and AF AFOSR265 63
AFOSR 4903 Unclassified report

Descriptors: (*Birds, Celestial navigation), (*Celestial navigation, Birds), Periodic variations, Night sky, Photographic recording systems, Test methods, Simulation, Direction finding, Reaction (Psychology)

A total of 195 experiments were performed during the fall migration under three basic environmental conditions, in all cases with only the overhead sky visible to the bird. First, under clear starlit skies, secondly, under clear starlit skies with the moon visible, and finally tests under artificial overcast. The tests under moonlit skies showed a clear tendency for the bird to head either in the direction of the moon or in the direction of the side of the apparatus lighted by the moon, i.e., directly away from the moon. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-414 121 Div. 20
(TISTB/AAR) OTS price $3.60

Boeing Co., Seattle, Wash.
A GEOMETRICAL ANALYSIS OF THE SEATED HUMAN BODY FOR USE IN RADIATION DOSAGE CALCULATIONS,
by David L. Dye and Ben Pearson. 24 July 62, 38p.
Document no. D2 90107
Unclassified report

Descriptors: (*Whole body irradiation, Dosage), Radiation measurement systems, Radiation monitors, Radiobiology, Analysis, Geometry, Human engineering, Lungs, Bone, Body, Thickness.

The particular problem treated in this document is the determination of the thickness of material that must be traversed by incident radiation coming from every direction if it is to reach a particular body-interior point. Specifically, we have calculated the fractional solid angle subtended, around each of twelve body points, by various tissue thicknesses. As a part of this calculation, contours of 'isothickness' are given for a seated 75-percentile man. The tables of fractional solid angle vs. tissues thickness are directly useful in computing a body point dose in an isotropic radiation flux. The contours of constant tissue thickness are needed to compute numerically the body point dose in a known non-isotropic radiation field. Coupled with the detailed design of a spacecraft, the dose to these specific body points from a given incident radiation could be calculated. (Author)

AD-414 133 Div. 20
(TISTM/AMS) OTS price $2.60

University Coll., London (Gt. Brit.).
PION-NUCLEON SCATTERING AND THE J = 2, T = 0 PION-PION INTERACTION,
by G. C. Oades. 20 May 63, 22p. Technical note no. 13
Grant AF EOAR63 3
AFOSR 4923
Unclassified report

Descriptors: (*Pions, Scattering), (*Nucleons, Scattering), Equations, Partial differential equations, Nuclear energy, Wave transmission.

AD-414 166 Div. 20
(TISTM/ODN) OTS price $1.10

Kansas U., Lawrence.
LIQUID NITROGEN/ARGON BUBBLE CHAMBER DESIGN PROJECT.
Final rept.,
by Robert Stump. 1963, 6p.
Grant AFOSR 61 86
AFOSR 4969
Unclassified report

Descriptors: (*Bubble chambers, Design), Liquefied gases, Nitrogen, Argon, Sensitivity, Cryogenics.

This report discusses a project undertaken with the purpose of designing some equipment for research in high-energy physics, and of planning experiments to be done at the ZGS accelerator at the Argonne National Laboratory. Three lines of investigation were followed: the design of a bubble chamber suitable for use with liquid nitrogen or liquid argon; the design of a spark chamber for some specific experiments; and the detailed investigation of several experiments. (Author)

AD-414 174 Div. 20, 14, 25
(TISTM/EJH) OTS price $3.60

Naval Radiological Defense Lab., San Francisco, Calif.
IGNITION OF CELLULOSIC KINDLING FUELS BY VERY BRIEF RADIANT PULSES,
by S. Martin. 15 July 63, 25p.
USNRDL TR660
Unclassified report

Descriptors: (*Thermal radiation, Nuclear explosion damage), (*Ignition, Thermal radiation), (*Cellulose, Thermal radiation), (*Paper, Thermal radiation), Ablation, Flames, Test methods.

Radiant exposure values are reported for sustained flaming ignition of black α-cellulose, newspaper and kraft corrugated board exposed to constant-irradiance, thermal inputs of 30 ms duration and longer. The radiant exposure values are shown to be approximately proportional to the thickness of the exposed material and not strongly dependent on exposure duration for pulses this brief. The significance of sustained flaming ignition, relative to ablation effects, for pulses of very brief duration is discussed. (Author)

AD-414 176 Div. 20
(TISTB/AAR) OTS price $3.60

Boeing Co., Seattle, Wash.
SPACE PROTON DOSES AT POINTS WITHIN THE HUMAN BODY,
by David L. Dye. 1962, 29p.
Unclassified report

Presented to the Symposium on Protection Against Radiation Hazards in Space, 5-7 Nov 62, Gatlinburg, Tennessee.

Descriptors: (*Protons, Spaceborne), (*Dosage, Protons), Body, Thickness, Distribution, Sensitivity, Spinal cord, Eye, Skin, Radiation hazards.

Distribution patterns of absorbed dose influence the radiation response of a mammalian system, because of differing radiosensitivities of different organ systems. In a man exposed to space radiations; e.g., an astronaut, body self-shielding produces nonuniform dose distributions which depend upon external shielding configurations and the incident radiation parameters. In this paper are presented the doses at twelve specific points in the body of a seated man exposed to isotropic incident space protons, where the man is inside various thicknesses of external vehicle shell shielding. The body points, selected for their radiobiological interest, are in (or on) sternum, chest skin, femur, spinal column, eye, central gut, and a series at various lateral depths on the waist. The protons reaching these specific points from all directions traverse tissue thicknesses that were determined from scale drawings of a statistically standard man (75-percentile). The proton penetration, secondary radiation generation, and total dose delivered to each specific body point was calculated using an IBM (Fortran) computer code. (Author)

Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-414 394 Div. 20, 4, 25
(TISTM/EJH) OTS price $8.10

Astropower Inc., Newport Beach, Calif.
PARTICLE DISINTEGRATION STUDY FOR RE-ENTERING NUCLEAR AUXILIARY POWER SYSTEMS.
Final rept, June 63,
by A. E. Levy-Pascal, L. E. Bell, R. R. Koppang and A. H. Malinovsky. June 63, 76p.
Contract AF29 601 5004, Proj. 1831, Task 183101.
AFSWC TDR63 51
Unclassified report

Descriptors: (*Auxiliary power plants, Radioactive waste), (*Nuclear power plants, Radioactive waste), (*Zuconium alloys, Radioactive waste), (*Uranium alloys, Radioactive waste), (*Radioactive waste, Nuclear power plants), (*Reactor fuels, Radioactive decay), Reentry vehicles, Drops, Gases, Atmosphere, Oxidation, Nitrides, Particles, Particle size, Particle trajectories, Nitrogen.

The purpose of this study was to determine the chemical history and related physical phenomena of liquid Zr-U droplets in the presence of a flowing mixture of atmospheric gases at various partial pressures. A theoretical analysis of the aerodynamic and thermodynamic conditions affecting the droplets was carried out. Experimental investigation was conducted on the interaction of particles of 50- to 200-micron size with oxygen and nitrogen at different concentrations and total pressures. The results obtained indicate that the droplets undergo partial or complete oxidation or nitridation, depending on experimental conditions. Only when oxygen was present did the droplets disintegrate into submicron particles. The frequency and mode of disintegration depend on the total pressure, oxygen concentration, and particle size; however, specific variables should be further investigated in order to reach more quantitative and realistic conclusions. (Author)

AD-414 400 Div. 20, 15
(TISTP/TCY) OTS price $1.60

Maryland U., College Park.
THE FOUNDATIONS OF SCATTERING THEORY AND APPLICATIONS TO PHYSICAL PROBLEMS.
Final research rept.
Dec 62, 17p.
Contract AF49 638 24
AFOSR 4514 Unclassified report

Descriptors: (*Scattering, Theory), (*Pions, Scattering), (*Nucleons, Scattering), (*K Mesons, Scattering), Quantum mechanics, Relativity theory, Momentum, Elementary particles, Exchange reaction, Matrix algebra, Nuclear cross sections.

AD-414 698 Div. 20
(TISTE/JBM) OTS price $4.60

Naval Radiological Defense Lab., San Francisco, Calif.
SUPPLEMENTARY ESTIMATES OF RADIATION GEOMETRY AND ENERGY RESPONSE FOR USNRDL GAMMA-INTENSITY-TIME RECORDER (GITR) MODEL 103,
by H. R. Rinnert. 13 May 63, 38p.
NRDL TR654 Unclassified report

Descriptors: (*Gamma counters, Performance), (*Radiation monitors, Gamma rays), Radiation measurement systems, Ionization chambers, Recording systems, Calibration, Configuration.

Estimates of radiation response are presented for the Model 103 Gamma-Intensity-Time Recorder (GITR) as used at Operation Sunbeam. The GITR detector unit, consisting of two concentric ionization chambers, was mounted inside the GITR recorder case and located 3 ft above ground level. GITR responses and their time-dependence were estimated for several idealized radiation source geometries and several calculated gamma energy spectra. Estimated response values are presented as fractions of the GITR's calibration-response to Cs137 radiation beamed at the top of the unmounted detector along its longitudinal axis. The principal conclusions drawn were that: The GITR responses to distributed sources with specified gamma energy spectra did not show a significant dependence upon the source geometries investigated. There were about 17% differences between the responses of the two concentric detectors. The responses changed about 15% during the first 100 hours after fission. The use of overall average GITR responses for distributed sources seems warranted; there is 95% confidence that 95% of the population of GITR responses will be within 12% of the overall average response of 1.16 for the high-range detector, and within 14% of the overall average response of 0.99 for the low-range detector, during the first 110 hours after fission. (Author)

AD-414 848 Div. 20, 15
(TISTP/JP) OTS price $2.60

Ecole Normale Superieure (France).
EIGHTFOLD WAY AND WEAK INTERACTIONS,
by Michel Gourdin. May 63, 23p. Technical note no. 11
Grant AF EOAR63 47
AFOSR 5054 Unclassified report

Descriptors: (*Nuclear particles, Algebras), Nuclear reactions, Baryons, Fermions, Groups (Mathematics), Mesons, Resonance scattering, Operators (Mathematics), Nuclear scattering.

The octet model is generalized in a way permitting to include the weak interactions. It turns out that the more simple solution - but not the only one of course - is an eight-fold way based on the orthogonal group in an eight-dimensional space SO(8). The mathematical structure of the inclusion between the algebra of the unitary group and the algebra of the orthogonal group is studied. The reduction under unitary transformation of the irreducible representations of the orthogonal group is examined and it can be shown that the orthogonal SO(8) group can generalize the octet model but not the triplet model. Moreover, the adjoint representation contains the weak currents and one can try to extend the octet model in this way. Finally, one constructs explicitly the model and gives a systematic classification of the weak currents with respect to the quantum numbers of the strong interactions. (Author)

AD-414 876 Div. 20, 7
(TISTP/FEM) OTS price $3.60

Airesearch Mfg., Co., Phoenix, Ariz.
SPUR POWER SYSTEM.
Quarterly progress rept. no. 5, 1 Apr-30 June 63,
by F. B. Wallace and R. W. Heldenbrand.
15 July 63, 28p. SY5396R5
Contract AF33 657 8954, Proj. 3145, Task 314511
Unclassified report

Descriptors: (*Power reactors, Space propulsion), (*Electric power production, Nuclear propulsion), (*Nuclear reactors,

Spacecraft), (*Creep, Materials), Rupture, Fatigue (Mechanical), Physical properties, Molybdenum alloys, Bearings, Liquids, Potassium, Films, Thickness, Heat, Sources, Energy conversion, Thermal utilization, Generators, Heaters, Stainless steel.

Continued analytical and experimental studies in support of the Space Power Unit, Reactor (SPUR) Program are presented. Progress is reported for a tital of six tasks. In addition to a discussion of the work accomplished by AiResearch, the prime contractor, this report contains a discussion of work accomplished by Aerojet-General Nucleionics (reactor system) and Battelle Memorial Institute (material support). (Author)

AD-414 881 Div. 20, 7
(TISTP/WH) OTS price $7.60

Airesearch Mfg. Co., Phoenix, Ariz.
SPUR POWER SYSTEM.
Quarterly progress rept. no. 4, 1 Jan-31 Mar 63, by F. B. Wallace and R. W. Heldenbrand.
15 Apr 63, 65p. Rept. no. SY5396R4
Contract AF33 657 8954, Proj. 3145, Task 314511
Unclassified report

Descriptors: (*Nuclear power plants, Auxiliary power plants), (*Spacecraft, Auxiliary power plants), Materials, Turbines, Generators, Heat transfer, Control systems, Liquid metals.

AD-414 885 Div. 20, 7
(TISTP/FEM) OTS price $13.50

AiResearch Mfg. Co., Phoenix, Ariz.
SPUR POWER SYSTEM.
Quarterly progress rept. 31 Dec 62, by F. B. Wallace. 15 Jan 63, 183p. Rept. no. SY5396R3
Contract AF33 657 8954, Proj. 3145, Task 314511
Unclassified report

Descriptors: (*Nuclear propulsion, Spacecraft), (*Space propulsion, Nuclear reactors), (*Power reactors, Electric power production), Generators, Liquid metal cooled reactors, Reactor control, Energy conversion, Thermal utilization, Heat transter, Heat exchangers, Simulation, Performance (Engineering), Materials, Creep, Rupture, Vacuum apparatus, Potassium, Vapors, Molybdenum alloys, Furnaces, Bearings, Lubricants, Turbines, Control, Thermionic converters, Manufacturing methods.

Continued analytical and experimental studies in support of the Space Power Unit, Reactor (SPUR) Program are presented. Progress is reported for a total of 32 tasks. In addition to a discussion of the work accomplished by AiResearch, the prime contractor, this report contains a discussion of the work accomplished by Aerojet-General Nucleonics (reactor system), Westinghouse Electric Corporation, (electrical generator), and Battelle Memorial Institute (material support). (Author)

AD-414 916 Div. 20, 30
(TISTM/EJH) OTS price $1.60

Uppsala U. (Sweden).
HIGH PRECISION NUCLEAR PROPERTIES STUDIES.
Final technical rept., by K. Siegbahn. 30 Mar 63, 1v.
AF EOAR Grant 62 72
AFOSR 4867 Unclassified report

Descriptors: (*Nuclear properties, Nuclear spectroscopy), (*Nuclear radiation spectrometers, Nuclear physics), (*Nuclear spectroscopy, Instrumentation), Instrumentation, Nuclear physics.

Techniques and equipment used in high precision nuclear property studies: Iron-free double focusing, iron youke double focusing, neutron capture, electron-electron coincidence, universal coincidence, and electron-gamma coincidence spectrometers. Gamma-gamma angular and differential angular correlations. Atomic beam magnetic resonance. (Author)

AD-414 959 Div. 20
(TISTP/WH) OTS price $10.50

Ballistic Research Labs., Aberdeen Proving Ground, Md.
NEUTRON REFLECTION AND FLUX VERSUS DEPTH FOR WATER. WITH AN APPENDIX -- COMPARISON WITH RESULTS OF NATIONAL BUREAU OF STANDARDS,
by Frank J. Allen, Arnold Futterer and William Wright. June 63, 147p.
Proj. 1A022601A088
BRL 1204 Unclassified report

Descriptors: (*Neutron flux, Water), (*Water, Neutron flux), Reflection, Neutron transport theory, Shielding, Dose rate, Albedo, Monte Carlo method, Tables.

Detailed calculated results on neutron reflection and flux versus depth for water are given in the form of machine printouts. The angular and energy distributions of the reflected neutrons along with the energy-dependent and total flux at various depths are contained in tabular form on the printouts. Neutron number current, number flux and dose transmission as functions of thickness are also given in tabular form on the printouts. A table of summary information on reflection is presented. This contains number current, number flux, dose and energy reflection factors as functions of incident energy and angle. A few figures are presented to illustrate graphically the meaning of the various tabular results. Some comparisons are made with results obtained by the National Bureau of Standards. (Author)

AD-414 985 Div. 20
(TISTM/AMS) OTS price $9.10

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
EVALUATION OF WATER CONTAMINATION FROM FALLOUT.
by W. N. Grune, T. F. Craft, Jr. and W. M. Sloan.
July 63, 197p.
Contract OCD OS62 189
Unclassified report

Descriptors: (*Water supplies, Radioactive fallout), (*Radioactive fallout, Water supplies), Water, Mathematical models, Particle size, Distribution, Mathematical analysis, Contamination, Radioactive isotopes, Soils, Nuclear warfare, Decontamination, Radiation hazards, Radiation effects, Programing (Computers), Pressure.

Methods for obtaining ionization rate contours.

fractionation numbers, atom-concentration intensity ratios, and particle size distribution from the Miller fallout model are given. Included are complete computer programs for estimating sublimation pressures, ionization rate contours, and particle size parameters. Graphical integration of activity from fallout over the watersheds serving Houston, Texas and New York City is described. Maximum levels of selected contaminants at the water intake for these cities under most adverse wind conditions were calculated and reported. It is concluded that the contribution of induced radioactivity to the contamination of water supplies would not be significant. Many commercially available instruments of the survey type can be used to detect adequately the presence of substantial concentrations of radioisotopes in water under emergency conditions. For more accurate measurement of such concentrations down to safe levels more sensitive equipment or methods of preconcentration of the samples are needed. (Author)

AD-415 023 Div. 20
(TISTP/WH) OTS price $2.60

Nuclear Defense Lab., Army Chemical Center, Md.
AN EVALUATION PROGRAM FOR RADIOACTIVE WASTE INCINERATION,
by Richard Dennis and William Kyritsis. Mar 63, 24p.
NDL TM8 Unclassified report

Descriptors: (*Radioactive waste, Incinerators), (*Incinerators, Radioactive waste), Air Gas flow.

A 50 lb/hr incinerator for the concentration of low-level radioactive combustible waste was designed and fabricated. This experimental unit was designed to investigate the effects of varying (1) the location, number, and orientation of overfire air inlets, (2) the inlet velocity and mass flow rate of primary and secondary combustion air, and (3) the auxiliary gas fuel supply to the primary and secondary combustion chambers. After optimum performance conditions are established, radioactive tracers will be utilized to evaluate the radiological limits of the unit, and actual radioactive waste will be incinerated. Experimental equipment will be eliminated in a final prototype design. Gas cleaning equipment, which will be required to maintain control of the release of radioactivity within federal regulations, will consist of conventionally manufactured stock items. (Author)

AD-415 052 Div. 20
(TISTM/ODN) OTS price $1.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
DECAY OF U235 FISSION PRODUCTS,
by J. F. Perkins. 25 July 63, 14p.
AMC Rept. no. RR TR63 11 Unclassified report

Descriptors: (*Uranium, Radioactive isotopes), (*Fission products, Radioactive decay), (*Radioactive isotopes, Uranium), Fission product activity, Nuclei, Energy, Fission, Tables, Data, Gamma rays, Beta particles.

Decay properties of mixed fission products from thermal fission of U235 have been calculated by a method employed earlier but with revised input data describing decay of individual nuclides. Input data and calculated decay rates of beta and gamma energy release are presented. (Author)

AD-415 083 Div. 20
(TISTM/EJH) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
PRIMARY AND SECONDARY GRAIN DENSITIES OF HEAVY ION IN INSENSITIVE EMULSIONS,
by E. V. Benton and H. H. Heckman. 6 July 63, 25p.
USNRDL TR657 Unclassified report

Descriptors: (*Photographic emulsions, Particles), (*Particles, Photographic emulsions), (*Ions, Photographic emulsions), Velocity, Sensitivity, Density, Neon, Oxygen, Carbon.

The grain densities of stopping C-12, O-16, and Ne-20 ions were measured as a function of velocity (beta greater than 0.145) in insensitive Ilford emulsion types K minus 1 and K.0. The measurements were carried out using photomicrographic techniques. An exponential gap-length distribution is observed for gap lengths greater than 0.25 microns for rates of energy loss up to 2.35 MeV/micron. The composition of the grain density is analyzed in terms of primary and secondary grain densities. It is concluded that the secondary grain density, which is due principally to delta-rays, accounts for about 35 percent of the total grain density observed in these insensitive emulsions. A generalized formula derived from these data expresses the observed grain density as a function of the particle's velocity and charge, and the sensitivity of the emulsion. (Author)

AD-415 102 Div. 20
(TISTP/WH) OTS price $6.60

Martin-Marietta Corp., Baltimore, Md.
NUCLEAR FUEL (OXIDE) CLAD THERMIONIC CONVERTERS.
Quarterly technical progress rept. no. 3, 1 May-31 July 63.
15 Aug 63, 1v. Rept. no. MND2945 3
Contract AF33 657 10077, Proj. 8173, Task 817305 20
Unclassified report

Descriptors: (*Thermionic converters, Nuclear power plants), Diodes (Electron tubes), Uranium compounds, Oxides, Cesium electron tubes, Reactor fuels, Pellets, Reactor fuel cladding, Metal coatings, Diodes.

The fabricated, performance testing, and evaluation of a double diode thermionic converter containing fuel-bearing emitters is treated. In a parallel effort, fuel pellets, with dimensions comparable to those of the emitters, are to be fabricated, thermally endurance tested, and evaluated. Finally, the results of the preceding efforts will be utilized to accomplish the design of an improved thermionic converter. (Author)

AD-415 118 Div. 20
(TISTP/HG) OTS price $1.10

Bartol Research Foundation, Franklin Inst., Swarthmore, Pa.
RESEARCH ON HIGH ENERGY PHYSICS INVESTIGATIONS USING NUCLEAR EMULSIONS.
Final rept., 1 Feb 61-31 Jan 63,
by M. A. Pomerantz and D. F. Davis. 31 Jan 63, 7p.
Contract AF49 638 1023, Proj. 9751, Task 37512
AFOSR 4999 Unclassified report

Descriptors: (*K mesons, Meson cross sections), Resonance absorption, Decay schemes,

Probability, Nucleons, Numerical analysis, Equations, Particle beams, Nuclear physics, Errors.

Reports results of an experiment to measure the K meson total absorption cross section. A stack of Ilford G5 emulsion 10 x 10 square centimeters in cross sectional area and 20 cm long was exposed to a beam of 1.3 Bev/c K mesons. An effort was made to measure the variation in intensity of the K particles with distance along the beam by counting the number of their interactions. In the experiment a beam of pure K particles was produced at the target. (Author)

AD-415 216 Div. 20
(TISTM/TCG) OTS price $1.10

Electronics Research Lab., U. of Calif.,Berkeley.
THE WAVE BASIS FOR ONSET OF INSTABILITIES IN ION-NEUTRALIZED ELECTRON STREAMS IN DRIFT TUBES,
by J. I. Frey and C. K. Birdsall. 1963, 3p.
Grant AFOSR117 63
AFOSR 5011 Unclassified report

Descriptors: (*Electron beams, Stability), (*Ions, Stability), (*Neutralization, Electron beams), Electron tubes, Drift, Frequency, Damping.

AD-415 319 Div. 20, 25
(TISTP/WH) OTS price $4.60

Naval Research Lab., Washington, D. C.
NRL QUARTERLY ON NUCLEAR SCIENCE AND TECHNOLOGY PROGRESS REPORT FOR THE PERIOD OCTOBER-DECEMBER 1962.
1 Jan 63, 42p.
Unclassified report

Descriptors: (*Nuclear physics, Periodicals), Elementary particles, Baryons, Neutrinos, Field theory, Cosmic rays, Oceans, Gamma rays, Plasma physics.

Contents: Quaternion approach to elementary particle theory; Baryon doublets and neutrino doublets; Theorems for construction of explicit representations of unitary operators in quantum field theory; Observations of nuclear and cosmic radiation in the ocean; Beam and Plasma Physics--The half-lives of Cs137 and Co60.

AD-415 354 Div. 20
(TISTP/MH) OTS price $16.00

La Plata U. (Argentina).
STUDIES ON THE PROPERTIES AND SYSTEMATICS OF NUCLEAR STRUCTURE EFFECTS.
Final technical rept., June 61-May 62.
May 62, 1v.
Grant AF AFOSR61 39
AFOSR 4920 Unclassified report

Descriptors: (*Nuclear structure, Theory), Decay schemes, Gamma rays, Radioactivity, Instrumentation, Isomeric transitions, Antimony, Cesium, Beta ray spectroscopy.

The technical report corresponds to the period June 1961-May 1962. Many studies have been undertaken at this laboratory of nuclear physics, and some work is still in progress. The work performed can be classified in five items: Decay schemes studies, Electron-gamma coincidences with solid state detectors, Miscelaneous work on radioactivity, Development of nuclear instruments, and Seminars. (Author)

AD-415 355 Div. 20
(TISTP/JP) OTS price $1.60

Aerospace Information Div., Washington, D. C.
SOVIET RESEARCH REACTOR RFT SUMMARY OF DATA.
2 Aug 63, 14p. Rept. P63 103; Rept. 9
Unclassified report

Descriptors: (*Research reactors, Analysis), Reactor control, Reactor fuels, Reactor operation, Reactor system components, Reactor coolants.

A detailed description of the RFT research reactor is given. The presentation includes background information, design features, reactor parameters, and information on experimental facilities afforded by the reactor, together with illustrations and diagrams. (Author)

AD-415 384 Div. 20
(TISTM/AMS) OTS price $1.60

California U., Los Angeles.
DESIGN CONSIDERATIONS FOR A 0 TO 45 DEGREE BENDING MAGNET,
by A. C. Paul and Byron T. Wright. July 63, 15p.
Contract Nonr23344
Unclassified report

Descriptors: (*Cyclotron magnets, Proton beams), Copper, Design, Magnetic properties, Magnet coils, Magnetic fields, Particle accelerator components, Particle trajectories, Particle beams, Equations.

The magnet design proposed in this report provides a maximum of flexibility for future changes in the external beam requirements. A pair of magnets of 4.5 inch aperture permitting an angular bend continuously adjustable (by easily accomplished shimming) from 0 to 45 degrees on a 30 inch radius of curvature is considered. This corresponds to a magnetic field of 13,500 gauss for 50 MeV protons. These magnets can either be used indidivually as beam switching magnets or together as a dispersionless beam transport system (Author)

AD-415 450 Div. 20
(TISTP/HG) OTS price $2.60

Ecole Normale Superieure (France).
INTERPLAY OF COMPETING RESONANCES,
by Bernard d'Espagnat and Fernand Michel Renard.
May 63, 27p. Technical note no. 10
Grant AF EOAR63 47
Unclassified report

Descriptors: (*Resonance scattering, Mathematical models), (*Resonance, Decay schemes), Matrix algebra, Operators (Mathematics), N body problem, Nuclear reactions, Integral equations, Functions, Energy.

When more than two strongly interacting particles are produced in a collision resonances frequently take place between two of these particles: these resonances are observed as bumps in the energy or so-called ''invariants mass'' distributions. However, these bumps do not always occur in the phenomena. If a resonance is broad enough, it decays very near its point of production and thus leaves the possiblity open that the other competing resonance sets in and washes out the observable effects of the first. There is an integral equation which could in a way be inter-

preted as describing some phenomenon of this kind, but has been solved only in the case in which the two resonances are kinematically related. The general case is studied using more free parameters, and to investigate to what extent the real behaviour of the system is investigated under variations of these parameters. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-414 350 Div. 22
(TISTP/AW) OTS price $1.10

Naval Ordnance Lab., White Oak, Md.
CHARTS FOR THE PARAMETERS OF MIGRATING EXPLOSION BUBBLES,
by H. G. Snay and Ruth V. Tipton. 15 Oct 63, 14p.
NOLTR 62 184
Unclassified report

Descriptors: (*Explosion bubbles, Mathematical analysis), (*Underwater explosions, Bubbles), Motion, Energy, Equations, Surfaces, Oscillation.

Graphs are presented for the relative bubble energies, maximum radii, periods, and migrations of underwater explosion bubbles for four cycles of the bubble oscillation. The migration refers to the bubble maximum in each cycle. The position of the bubble minimum can be readily found by a simple computation. The graphs permit a convenient reading of these parameters for a wide range of conditions. (Author)

AD-414 693 Div. 22, 4
(TISTM/TCG) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
PREPARATION OF POROUS NITROCELLULOSE FOR A TRAVELING CHARGE GUN.
by James E. Cole and Carl R. Ruth. June 63, 17p.
Proj. 1M010501A004
BRL Memorandum rept. no. 1485
Unclassified report

Descriptors: (*Nitrocellulose, Preparation), (*Propellants, Nitrocellulose), (*Organic compounds, Propellants), Projector charges, Projectiles, Explosive materials, Porosity, Density, Inhibition, Aging (Materials), Compressive properties, Processing, Test methods.

A method is described for the preparation of porous nitrocellulose propellant with a density-gradient of 0.9 gm/cc at one end to 1.2 gm/cc at the other end. Hardware refinements are discussed for the loading and pressing of the nitrocellulose. A table is included showing the variation of density with different compressional forces. A description is given of the assembling of the hardware and inhibiting the propellant. (Author)

AD-414 795 Div. 22
(TISTP/AW) OTS price $5.40

Ammunition Engineering Directorate, Picatinny Arsenal, Dover, N. J.
PRODUCTION ENGINEERING OF WARHEAD SECTION 762MM ROCKET, PRACTICE: XM38 (M38),
by Sydney Gordon. July 63, 52p.
PA Technical rept. no. 3074
Unclassified report

Descriptors: (*Artillery rockets, Rocket heads), Training ammunition, Production, Warheads, Smoke munitions, Rocket motors (Solid propellant), Rocket fuzes, Costs.

The Warhead Section, 762mm Rocket, Practice: M38 is the result of production engineering the Warhead Section, 762mm Rocket, Practice: XM38. The M38 Warhead is an Honest John Warhead which consists of an aerodynamic shell, structural members, fuzing system, two flash-smoke charges and a ballast assembly. It has the same weight, contour and centers of gravity as the M144 (T2044E1) Warhead Section. The M38 Warhead Flash-Smoke charges are located in the aft section of the warhead and have a minimal weight consistent with visibility requirements. The Honest John Rocket is a free-flight artillery rocket with a solid-propellant motor. The rocket was designed for tactical use by the field artillery. The M38 Warhead will be utilized primarily with the XM50 Rocket System which is the Improved Honest John Rocket. The rocket is launched from the self-propelled XM386 Launcher, which is variable in azimuth and elevation. With a 1,625-pound warhead section, the rocket has a maximum range of about 35,000 meters. The M38 Warhead for the Honest John has been designed, production engineered, standardized, and is in production. This report provides a final summary of the industrial engineering effort in the development of the M38 Practice Warhead. (Author)

AD-414 962 Div. 22, 9
(TISTP/WH) OTS price $3.60

Ohio State U., Columbus.
PROPAGATION OF SPHERICAL COMBUSTION WAVES.
Final technical rept., 1 Mar 61-30 Nov 62,
by J. W. Pliickebaum, W. A. Strauss, and R. Edse. June 63, 24p.
Contract AF33 616 8129, Proj. 7013, Task 701301
ARL 63 101 Unclassified report

Descriptors: (*Detonation waves, Spheres), (*Propagation, Detonation waves), Explosions, Explosion gases, Hydrocarbons, Nitrogen compounds, Hydrogen compounds, Ignition.

Measurements were made of propagation rates of spherical combustion waves in gaseous explosive mixtures, in 65 cm. idameter thin-walled rubber balloons and in a 40 cm. diameter steel bomb. The reults of these experiments show that (1) the detonation induction distances in acetyler

oxygen mixtures are inversely proportional to the ignition energy, (2) for a given ignition energy, the detonation induction distances, for acetylene-oxygen mixtures containing more than 24% but less than 48% acetylene by volume, are practically independent of the mixture ratio, (3) combustion waves of all acetylene-oxygen mixtures were initially overdriven no matter how they were ignited, and (4) the propagation rates of stabilized spherical detonation waves were practically indentical with the linear propagation rates observed in long tubes. (Author)

AD-415 008 Div. 22
(TISTP/AW) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
THE GROWTH TO DETONATION OF BINARY EXPLOSIVE MIXTURES,
by Howard S. Leopold. 16 Apr 63, 32p.
NOLTR 63 129 Unclassified report

Descriptors: (*Explosive materials, Detonations), Explosives, initiators, Lead compounds, Azides, PETN, RDX, Mistures, Sensitivity, Density, Velocity, Exploding wires.

The growth to detonation after initiation by exploding nichrome wires of lead azide and binary mixtures of lead azide with PETN or RDX was observed using a rotating mirror smear camera. The effects of mixture composition and loading pressure on the sensitivity and growth to detonation showed that the mixtures retained the sensitivity of the lead azide over a wide range of composition. Optimum detonation velocities were obtained for mixtures containing 40% by weight of secondary explosive, but the use of binary mixtures of the type reported on here in weapon detonators requires a definite minimum confinement for practicability. (Author)

AD-415 426 Div. 22
(TISTM/AMS) OTS price $3.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
RESPONSE OF SIMPLE GEOMETRIC SHELLS TO IMPULSIVE LOADING,
by Lawrence Rosendorf. July 63, 27p. Technical memo. 1227
Unclassified report

Descriptors: (*Geometric forms, Shock waves), (*Nuclear explosion damage, Geometric forms), (*Shock waves, Geometric forms), Cylindrical bodies, Dynamics, Loading (Mechanics), Explosion effects, Detonation waves, Blast, Shock (Mechanics), Buckling (Mechanics), Vulnerability, Mathematical analysis, Pressure, Distribution.

This report outlines a study on the response of simple geometric shells to blast loading, performed as in-house research as a part of AMS 5010.11.844. Three areas that are basic to the understanding of the problem are discussed. These are: The free air blast characteristics, the interaction of the blast wave and the stationary shell and the response of the shell to the blast impulse. Several techniques are cited which have been applied to shell response. A simplified analytical approach is used to predict the incipient damage points of simple shells. This approach is based on a ''dynamic load factor'' which enables one to compute the dynamic buckling pressure from the static formulations. (Author)

AD-415 451 Div. 22
(TISTP/AW) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
INVESTIGATION OF EXPLOSIVES SENSITIVITY TO MULTIPLE-FRAGMENT IMPACT (TRACK TEST E-7380),
by L. M. Patton. July 63, 26p.
NOTS TP32 76: Technical progress rept. 324
Unclassified report

Descriptors: (*Explosive materials, Sensitivity), Fragmentation, Test methods, Rocket-propelled sleds, Velocity, Detonations, Instrumentation, Charges (Explosive).

A rocket-powered sled was used to throw collections of fragments at explosive acceptor charges. Of the 13 rounds in this series, five, having a fragment velocity of 750 fps, produced five acceptor detonations; four rounds, at 330 fps, produced no detonations. The presence or absence of detonators in the acceptor charges had little apparent effect upon results. Specific warhead and explosives data relative to this series appear in Confidential Restricted Data report TPR 324, Supplement, NOTS TP 3277. Results of the first series of multifragment impact track tests are reported in NAVWEPS Report 8073, NOTS TP 3090 (Unclassified), dated December 1962. (Author)

23. PERSONNEL AND TRAINING

AD-414 289 Div. 23
(TISTB/WA) OTS price $2.60

Army Personnel Research Office, Office of the Chief Research and Development, Washington, D.C.
SCREENING DEVICES FOR SELECTIVE SERVICE REGISTRANTS WHO FAIL AFQT 7 AND 8,
by A. G. Bayroff, E. F. Heermann and Alan A. Anderson. Jan 63, 22p.
Proj. 0J95 60 001
APRO TRR1130 Unclassified report

Descriptors: (*Psychometrics, Military personnel), (*Military personnel, Selection), Statistical analysis, Test construction (Psychology), Recruiting, Achievement tests, Effectiveness.

Appropriate methods must be readily available for detecting attempts to evade military service through failing the Armed Forces Qualification Test (AFQT), the primary mental screening measure for both enlistment applicants and Selective Service registrants. The present report describes the development of special scoring devices--'failure keys'--for use with AFQT Forms 7 and 8. The failure keys were developed based on differences in responses of two AFQT 5-6 samples: true failures (N = 800 SS reg.) and those who deliberately attempted failure (N = 1600 EM). On basis of scoring results, the newly constructed keys provided even more efficient identification of deliberate failures and true failures than did similar devices used with prior AFQT forms and left a smaller percentage of AFQT failure uncategorized. The keys developed in the present study were operationally introduced 1 July 1960 along with AFQT 7 and AFQT 8. (Author)

AD-414 666 Div. 23, 28
(TISTB/CCH) OTS price $4.60

Franklin Inst., Philadelphia, Pa.
EXPERIMENTAL STUDY OF THE NATURAL PILOT FLIGHT PROFICIENCY EVALUATION MODEL,
by Bernard L. Ryack, and Ezra S. Krendel.
Apr 63, 38p.
Contract N61339 323
NTDC Rept. no. 323 2 Unclassified report

Descriptors: (*Pilots, Performance tests), (*Psychometrics, Pilots), (*Flight, Models (Simulations)), Effectiveness, Human engineering, Control system, Display system, Tracking, Transfer of training, Tables, Analysis.

This experiment investigated two major hypothesis generated by the Natural Pilot Model for Flight Proficiency Evaluation. These specify that human adaptability and economy of effort as understood in the context of servo-mechanism theory are important parameters of flying proficiency, and serve to differentiate proficient (''natural'') from poor (''mechanical'') operators. Adaptability was studied by systematically varying the controlled-element dynamics (control-display relationships); economy of effort, by varying the percent of time during which information was displayed (target intermittency). For all experimental conditions, the proficient trackers retained superiority over the poor ones. For intermittency conditions, performance decrement was the same for proficient and poor trackers. For the condition of changing control-display dynamics, one of the three measures of system performance showed less variation and less variation and less decrement for the proficient than for the poor trackers. Conventional tracking practice did not improve performance as measured by the adaptation and economy of effort criteria. (Author)

AD-414 670 Div. 23
(TISTB/AAR) OTS price $6.60

Applied Psychological Services, Wayne, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION. A MULTIDIMENSIONAL SCALING ANALYSIS OF THE CIRCUIT TYPES REPAIRED BY NAVAL AVIATION ELECTRONICS TECHNICIANS,
by Douglas G. Schultz and Arthur I. Siegel.
July 63, 53p.
Contract Nonr2279 00
Unclassified report

Descriptors: (*Military personnel, Training), Performance tests, Personnel, Electronics, Scale, Analysis.

This is the third in a series of studies investigating the applicability of multidimensional scaling techniques in the job performance area. In this study, the circuits repaired by Naval aviation electronics technicians in the performance of their duties were used as the stimulus materials. Similarity judgments among the circuit pairs were made by supervisory personnel and analyzed by multidimensional scaling methods. It is concluded that it is feasible and fruitful to apply multidimensional scaling techniques to the classification of electronic circuits worked on in the performance of Naval jobs. The avionic circuits repaired by Naval aviation electronics technicians, as represented in the circuit list developed in the study, were perceived as involving sixteen underlying dimensions. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-414 346 Div. 24, 2
(TISTP/MFA) OTS price $2.60

Notre Dame U., Ind.
INTERPRETATION OF GLACIAL DRIFT FROM COLOR AIRPHOTOS.
Final rept.,
by Erhard M. Winkler. July 63, 28p.
Contract Nonr162308, Proj. NR387 024
Unclassified report

Descriptors: (*Aerial photography, Terrain), (*Stratigraphy, Analysis), (*Detection, Minerals), Glaciers, Radioactivity, Infrared radiation, Soils, Color film, Clay minerals, Plants (Botany), Moisture, Measurement.

AD-414 563 Div. 24, 2
(TISTA/JGW) OTS price $3.60

Allied Research Associates Inc., Boston, Mass.
A MODIFICATION OF THE FUJITA METHOD FOR TIROS PHOTOGRAPH RECTIFICATION,
by John F. Cronin and Leonard W. Abreu.
15 June 63, 29p.
Contracts AF19 628 320 and AF19 628 306, Proj. 6698, Task 669802
AFCRL 63 670 Unclassified report

In cooperation with W. E. Howell Associates, Inc. Bedford, Mass., Contract AF19 628 306.

Descriptors: (*Meteorological satellites, Photogrammetry), Photographic reconnaissance, Surface targets, Position finding, Geometry, Geodesics, Rectifiers, (Photographic), Mapping, Clouds.

A Manual technique is described that enables the research meteorologist and others to portray with maximum accuracy a latitude-longitude net on a satellite photograph of the earth and its cloud masses. Unlike other techniques a rectification may be obtained for any orbit; heretofore, orbits without horizons could not be rectified graphically. (Author)

AD-414 822 Div. 24, 25, 28, 16
(TISTE/OHD) OTS price $15.00

Sylvania Electric Products, Inc., Waltham, Mass.
APPLICATION OF COLOR VISION THEIRY TO TWO-COLOR MIXTURES.
Final rept.
23 Aug 63, 1v. Rept. no. F2022 1
Contract AF30 602 2635
RADC TDR63 236 Unclassified report

Descriptors: (*Colorimetry, Theory), (*Color vision, Colors), Photographic filters, Optical filters, Slide projectors, Experimental data, Tables, Human engineering.

Data was collected on two-color mixtures to evaluate the effects of photographic filters (i.e., densities of corresponding pairs on two slides) and projection filters on perceived hue and saturation. The first part of the program employed broad band filters. Three slides were combined

factorially, yielding slide pairs. Each of these pairs was projected through nine filter combinations. Subjects judged the hue and saturation of nine stimulus chips. It was found that some but not all pairs of projection filters yielded a full range of color and further, that classical color mixture theory was adequate to explain the perceived colors if consideration was given to the induction of the complement of the background color. The second part of the program employed narrow-band filters. Fifteen pairs of slides were combined factorially with twenty-seven pairs of projection filters and seven conditions of ambient illumination. As with the broad band filters, it was found that some but not all filter combinations produced a full range of color. However, classical color mixture theory was not adequate to explain all the perceived hues. Finally, a portion of the data was used to evaluate the model of color perception proposed by Yilmaz. (Author)

AD-415 129 Div. 24
(TISTA/VGW) OTS price $1.60

Brown Engineering Co., Huntsville, Ala.
A TECHNIQUE FOR OBTAINING TRUE DIMENSIONS FROM PHOTOGRAPHS,
by John B. Middleton, Jr. June 63, 15p.
TN R53
Contract DA01 0090RD1068
Unclassified report

Descriptors: (*Photogrammetry, Optical analysis), (*Photographic images, Measurement), Mathematical analysis, Theory, Errors, Aerial photography, Reconnaissance missiles, Photographic reconnaissance.

A technique is presented for obtaining actual dimensions of objects shown in photographs. Unit calibration depends upon a knowledge of the optics system involved or, in a given photograph, the availability of an object of known dimensions. (Author)

AD-415 459 Div. 24
(TISTM/TCG) OTS price $.50

Air Force Avionics Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
NEW LOW-CONTRAST DEVELOPER FOR RAPID PROCESSING OF AERIAL AND DUPLICATING FILMS.
Final rept., Jan 61-Jan 63,
by Athans C. Zonars. July 63, 14p.
Proj. 6237, Task 623701
ASD TDR63 487 Unclassified report

Descriptors: (*Photographic processors, Photographic film), (*Photographic film, Photographic processors), (*Aerial reconnaissance, Photographic film), Processing, Photographic chemicals, Photographic emulsion, High-temperature research, Time, Sensitivity, N-heterocyclic compounds, Aromatic compounds, Polycyclic compounds, Monocylcic compounds, Photographic equipment, Carbonyl group.

A low-contrast photographic developer has been formulated for rapid processing (90 F) of currently available aerial reconnaissance and duplicating films. Active developing agents are 1-phenyl-3-pyrazolidone (Phenidone) and Hydroquinone. Tests indicate that the developer can best be used with the 8401 (Kodak Plus-X Aerecon), SO-243 (Kodak High Definition), SO-278 (Kodak Fine Grain Duplicating), and 5227-84 (Type 1A Class G2 Films). The developer produces gammas from 1.0 to 1.5 while maintaining rated emulsion speeds. This developer can also be used for processing at 68 F, although it produces higher contrast results under these conditions. (Author)

25. PHYSICS

AD-414 107 Div. 25, 2
(TISTP/MFA) OTS price $7.60

Navy Mine Defense Lab., Panama City, Fla.
THE PROPAGATION AT SHORT RANGES OF ELASTIC WAVES FROM AN IMPULSIVE SOURCE AT A LIQUID-SOLID INTERFACE -- THE FLUID-TWO LAYER SOLID SYSTEM,
by Frank R. Spitznogle. Aug 63, 69p.
Subproject no. SF0110101, Task 2612
NMDL Rept. no. 206 Unclassified report

Descriptors: (*Underwater sound, Propagation), (*Sound transmission, Analysis), Underwater explosions, Pressure, Ocean bottom, Stresses, Fluids, Models (Simulations), Water, Glass, Aluminum, Partial differential equations, Refraction, Solids, Reflection.

An extension is presented to a system of a fluid layer and two underlying solid layers, of a theory recently published by Strick which concerns the prediction of the pressure field produced at short ranges by an impulsive sound source near a fluid-homogeneous solid interface. The theoretical extension should prove useful in permitting the prediction of the pressure field at close ranges produced by a low-frequency sound source lying near the ocean floor. Although the final form of the extended theory is not obtained in closed form, it can predict all arrivals at short ranges. It is concluded that the existence of Stoneley waves at a solid-solid interface is unlikely, although reflections from the solid-solid interface may be responsible for the formation of additional Stoneley waves at the fluid-solid interface. (Author)

AD-414 108 Div. 25, 14
(TISTM/TCG) OTS price $.50

Air Force Materials Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL CONFIRMATION OF THERMO-ELASTIC EQUATIONS FOR SANDWICH PANEL DEFLECTION.
Final rept., Oct 60-Oct 62,
by I. K. Ebcioglu, J. A. Roberson, J. R. Schmermund and K. D. Shimmin. July 63, 14p.
Proj. 7351, Task 735106
ASD TDR63 559 Unclassified report

Report on Metallic Materials.

Descriptors: (*Sandwich panels, Deflection), (*Differential equations, Elasticity), (*Thermodynamics, Elasticity), Mechanical properties, Theory, Thickness, Thermal expansion, Test equipment.

Deflection tests were performed on a sandwich panel made by Aeronca Manufacturing Corp. The panel was tested under a compressive edge load and with an arbitrary temperature distribution on the upper and lower faces. The center deflection of the panel was measured and compared with the calculated value. Good agreement has been found between experiment and theory. (Author)

AD-414 116 Div. 25
(TISTM/REB) OTS price $1.10

New Hampshire U., Durham.
CONDUCTION THEORIES IN GASEOUS PLASMAS AND SOLIDS.
Final rept. 1 Oct 59 - 31 Oct 61,
by L. Mower, J. E. Mulhern Jr., Richard Brooks, Richard Hohly and Elizabeth R. Tuttle. 31 Oct 61, 4p.
Contract AF49 638 687
AFOSR 1843
Unclassified report

Descriptors: (*Plasma physics, Transport properties), (*Solids, Transport properties), Electromagnetic fields, Acoustics, Attenuation, Temperature, Semiconductors, Magnetic fields, Relaxation time, Electromagnetic waves, Resistance (Electrical)

The theoretical studies on the transport properties of ionized media performed have been based entirely on the effective particle approach and have ignored all correlation effects as well as quantum corrections. Within this approximation several specific problems have been treated: the anomalous skin effect, the magneto-acoustic effect, magneto-galvanic resistance, and certain aspects of microwave diagnostics. The first two effects are of considerable interest in metals and semi-metals and were studied and extended so as to apply to plasmas. The microwave diagnostic techniques developed here were originally aimed at the interpretation of a specific problem in plasma physics but are of sufficient generality to treat a class of problems involving magneto-hydrodynamic fluids, semi-metals, as well as semi-conductors. (Author)

AD-414 123 Div. 25, 9
(TISTP/MFA) OTS price $3.60

Minnesota U. School of Chemistry, Minneapolis.
THEORY OF ABSORPTION LINE SHAPES IN MONATOMIC GASES. I: GENERAL FORMULATION AND APPROXIMATE SOLUTIONS,
by Hisao Takebe, Gene P. Reck and C. Alden Mead. 1962, 37p.
Contract AF49 638 940
AFOSR 4869 Unclassified report

Descriptors: (*Gases, Refractive index), (*Line spectrum, Measurement), (*Absorption, Analysis), Theory, Atomic properties, Sodium, Atomic energy levels, Propagation, Fourier analysis, Polarization, Electromagnetic waves, Electrostatics, Integration.

A formalism is developed for calculating the complex refractive index of a monatomic gas as a function of frequency in the region of an absorption. The treatment involves a direct study of the properties of the dressed photon state in the gas, and includes effects due to translational motion of the atoms as well as the dipolar 'resonance' interactions between them. It is necessary to assume that the electromagnetic properties of the gas are describable in some detail by a linear frequency- and wave-number-dependent susceptibility. A set of coupled nonlinear integral equations are derived which together determine the susceptibility function and hence the observable refractive index. The 'static' limit of large atomic mass is considered in some detail, and a first correction to it is also obtained. The results are compared with measurements by Tomiser on the linewidths of the sodium D-line at various temperatures and pressures. We obtain qualitative agreement, while previous theoretical linewidths were too small by a factor of order 1000. (Author)

AD-414 125 Div. 25
(TISTM/TCY) OTS price $2.60

Hebrew UO. (Israel).
HYPERFINE INTERACTIONS IN THE GROUND STATE AND 21.7 KEV STATE OF Eu-151 IN EUROPIUM IRON GARNET,
by I. Nowik and S. Ofer. June 63, 23p. TN8
Contract AF61 052 347,
AFOSR 50 61
Unclassified report

Descriptors: (*Europium, Hyperfine structure), (*Hyperfine structure, Equation of state), (*Garnet, Europium), Iron compounds, Magnetic fields, Exchange reactions, Quadrupole moments, Magnetic moments, Resonance absorption, Spin, Electronic equipment, Cryogenics.

The hyperfine interaction of the ground state and 21.7 kev state of Eu-151 in europium iron garnet have been measured at 300, 81 and 20K using the technique of Mossbauer absorption. Values of (335 ± 50) koe, (570 ± 35) koe and (670 ± 100) koe were found for effective magnetic fields acting on the Eu nuclei in europium iron garnet at the temperatures of 300, 81 and 20 K respectively. These values are in agreement with theoretical calculations of the non-diagonal matrix elements associated with the admixture of states produced by the exchange interaction. The value of the quadrupole interaction of the ground state of Eu-151 in europium iron garnet was found to be (-240 ± 100)mc/sec at 81 K. The results yield an assignment of a spin of 7/2 for the 21.7 kev level and a value of mu = (2.54 ± 0.15) n.m. for the magnetic moment of this level. (Author)

AD-414 157 Div. 25
(TISTM/BRW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FUSIBILITY DIAGRAMS IN THE SYSTEMS LiClO4 - Ca(ClO4)2 AND NaClO4 - Ca(ClO4)2,
by N. V. Krivtsov and A. A. Zinov'yev. 15 Aug 63, 12p.
FTD TT63 565 Unclassified report

Trans. from Zhurnal Neorganicheskoy Khimii, Izdatel'stvo AN SSSR, 8:1, pp. 186-191, 1963.

Descriptors: (*Phase studies, Perchlorates), (*Perchlorates, Melting), Calcium compounds, Lithium compounds, Sodium compounds, Decomposition, Solid solutions, Transition temperature, Eutectics.

The systems LiClO4 - Ca(ClO4)2 and NaClO4 - Ca(ClO4)2 were studied. The fusibility diagram in both systems is characterized by a simple eutectic and by polymorphic transitions of the components. Forming compounds in these systems was unsuccessful. In the system NaClO4 - Ca(ClO4)2 in the region rich in sodium perchlorate, the existence of two solid solutions is proved. On the basis of thermographic study of calcium perchlorate and a study of systems derived from it data were obtained which indicated the presence of three polymorphic modifications of calcium perchlorate with transition points at 342 and 406 C. (Author)

AD-414 183 Div. 25, 26, 8
(TISTM/REB) OTS price $4.60

Eagle-Picher Research Labs., Miami, Okla.
GALLIUM PHOSPHIDE DEVICES.
Quarterly technical rept. no. 2, 14 Mar-14 June 63,
by Louis E. Stone, Jno. E. Budiselic, J. S. Roderique, George N. Webb and Lloyd W. Brown. 14 July 63, 42p.
Contract DA36 039 amc 00103
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Gallium alloys, Semiconductor devices), (*Phosphorus alloys, Crystal growth), (*Semiconductor devices, Gallium alloys), (*Single crystals, Gallium alloys), Synthesis (Chemistry), Epitaxial growth, Diodes (Semiconductor), Manufacturing methods, Melting.

The synthesis of gallium phosphide has been pursued. Several alternate vapor synthesis methods were explored with negative results from a practical viewpoint. The melt growth of gallium phosphide was impeded by furnacing difficulties which essentially have now been resolved. Epitaxial growth of gallium phosphide was accomplished with good control of growth rates and doping by the sealed ampoule iodine transport method. Photographic evidence of structures indicate excellent quality. Epitaxial growth of gallium phosphide by an open-flow iodine transport system was accomplished. Results are equally good and this method offers facilities in alternate type, consecutive growth of layers without interruption. Optical transmission of bulk undoped gallium phosphide material has been determined. Transmission in the visible spectrum is very good, and supports the feasibility of light operated 3-terminal devices. Infrared transmission of two samples was determined. Transmission was low between 3 and 16 microns. Diffused diodes were fabricated and tested. (Author)

AD-414 190 Div. 25, 17
(TISTM/BRW) OTS price $1.10

Michigan U., Coll. of Engineering, Ann Arbor.
INVESTIGATION OF LIQUID METAL BOILING HEAT TRANSFER.
Quarterly progress rept. no. 1,
by Richard E. Balzhiser, Robert E. Barry, C. Phillip Colver, Herman Merte, and Andrew Padilla, Jr. Aug 63, 2p. Rept. no. 05750 3 P
Contract AF33 657 11548, Proj. 05750
Unclassified report

Descriptors: (*Liquid metals, Heat transfer), (*Boiling, Heat transfer), Potassium, Sodium.

AD-414 196 Div. 25
(TISTP/MH) OTS price $19.75

Columbia U., School of Engineering, New York.
AN EXPERIMENTAL STUDY OF HEAT TRANSFER AT HIGH TEMPERATURE DIFFERENCES IN TURBULENT AIR FLOW BETWEEN A ROTATING CYLINDER AND A STATIONARY CONCENTRIC OUTER CYLINDER.
Final rept.,
by G. S. Longobardo and H. G. Elrod. Aug 62, 1v.
Contract AF49 638 1001
AFOSR 3207 Unclassified report

Descriptors: (*Heat transfer, Fluid flow), Turbulence, Air, Cylindrical bodies, Rotation, High temperature research, Surface area, Temperature, Velocity, Convection, Friction, Laminar flow, Rotation, Errors, Experimental data, Slip rings.

A study has been made of convective heat transfer between a rotating cylinder and a stationary, concentric outer cylinder for the Taylor number range 2000 to 9000, and for rotor surface temperatures in the range 80 F to 430 F. Measurements were made of overall heat transfer, and velocity and temperature distributions in the gap between the two cylinders. A hot wire anemometer was used to determine whether secondary flows exist in the gap in the Taylor number range of the investigation. (Author)

Division 25 - PHYSICS

AD-414 201 Div. 25
(TISTM/EJH) OTS price $12.00

Pennsylvania State U., University Park.
ELASTIC-PLASTIC RESPONSE OF A SLAB TO A HEAT PULSE,
by Yip-Chie Lee and Walter Jaunzemis. Mar 63, 155p. TR6
Grant AF AFOSR128 63
Unclassified report

Descriptors: (*Deformation, Thermodynamics), (*Elasticity, Thermodynamics), (*Plasticity, Thermodynamics), Stresses, Loading, Enthalpy, Entropy, Heat, Aluminum alloys, Mathematical analysis.

The objective of the present study is to establish thermodynamically valid, non-isothermal stress strain relations for the elastic-plastic range, and to obtain solutions of typical one-dimensional problems involving unsteady temperatures. The entropy balance equation and the expression for production of internal entropy are considered. The limitations imposed by the second law of thermodynamics upon plastic flow rules are investigated, and a set of non-isothermal plastic stress strain relations is introduced. It is shown that these relations are in accord with thermodynamic irreversibility whenever the yield criteria of Tresca and von Mises are used. The stress strain relations of von Mises are a special case of the non-isothermal stress strain relations proposed here. Precise criteria for elastic loading and repeated plastic flow are presented, thus completing the characterization of the elastic-plastic response. The second part is concerned with an application of the general theory to a problem for the infinite half-space constrained against lateral motion, and subjected to a heat pulse uniformly applied over its boundary. (Author)

AD-414 212 Div. 25
(TISTP/WH) OTS price $1.10

Paris U. (France).
X-RAY SCATTERING BY POINT DEFECTS.
Annual technical rept. 1 Mar 62-1 Mar 63,
by A. Guinier. Apr 63, 9p.
Grant AF EOAR 62 51
Unclassified report

Descriptors: (*X-rays, Scattering), (*Crystal lattice defects, X-rays), X-ray diffraction analysis, Cryogenics.

An apparatus for measuring the weak X-ray scattering due to punctual or very small defects is described. It is much more sensitive than the ordinary diffractometer because the solid angle of the beam received by the counter is much larger. Results on the scattering by solid solutions, impure crystals, irradiated crystals are given. (Author)

AD-414 257 Div. 25
(TISTP/FR) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INFRARED TECHNOLOGY IN COSMOS,
by A. Sergeyev. 21 June 63, 4p.
FTD TT63 444 Unclassified report

Trans. from Trud, No. 56, p. 3, 1963.

Descriptors: (*Infrared radiation, Infrared Phenomena).

AD-414 327 Div. 25
(TISTP/REB) OTS price $4.60

Aerospace Information Div., Washington, D. C.
PLASMA SPECTROSCOPY, ANNOTATED BIBLIOGRAPHY.
8 July 63, 40p.
AID B63 93 Unclassified report

Descriptors: (*Plasma physics, Bibliographies), (*Bibliographies, Plasma physics), (*Spectroscopy, Plasma physics), Electric arcs, Electric discharges, Plasma oscillations, Gas discharges.

AD-414 369 Div. 25
(TISTP/MFA) OTS price $5.60

Electronics Research Lab., U. of Calif., Berkeley.
LIMITATIONS OF SPACE-TIME HARMONICS FOR MICROWAVE AMPLIFICATION,
by T. E. Everhart and J. Horowitz. 14 Mar 62, 52p. Series no. 60, Issue no. 440
Contract AF33 657 7614, Proj. 4150, Task 415001
ASD TDR63 527 Unclassified report

Descriptors: (*Electromagnetic waves, Harmonic analysis), (*Electron beams, Microwave equipment), Electron guns, Waveguides, Bessel functions, Fourier analysis, Transformations (Mathematics), Time.

The possibility of gain utilizing the interaction between an electromagnetic wave in a smooth wave guide and a space-time harmonic of the slow space-charge wave has been proposed as a method of millimeter-wave amplification. A model is proposed here which satisfies the conditions necessary for the existence of space-time harmonics. This model is an idealization of a tube having two electron beams where the periodic variation of thd dc parameters of the inner beam is provided by a bunched hollow outer beam. Since the periodic variation of the inner beam results from the moving electric field of the bunched beam rather than stationary electric or magnetic fields, the device illustrates an application of space-time harmonics rather than space harmonics and introduces a new method of providing the required periodic variations. A small signal analysis of the model leads to vanishingly small expressions for the amplitudes of the n = 1,2,...space-time harmonics, and hence to the conclusion that for the model considered amplification over a wide band of frequencies is not practical. (Author)

AD-414 390 Div. 25
(TISTM/BRW) OTS price $33.50

Naval Ordnance Test Station, China Lake, Calif.
TEMPERATURE TABLES, TWO-LAYER PLATE, ONE-SPACE VARIABLE, LINEAR,
by H. N. Browne, Jr. and C. J. Thorne. 8 Oct 59, 413p.
NAVORD Rept. no. 5562, pt. 7, Vol. 1; NOTS TP2182 Unclassified report

Descriptors: (*Sheets, Heat transfer), (*Temperature, Tables), Equations, Thermal conductivity, Specific heat, Density, Thickness, Integral transforms, Time.

Temperature tables are given for the calculation of temperatures in a two-layer slab as a function of distance from one face and time. Heat is transferred at the interface and at the two outside faces. The complete solution is a linear combination, V sub 1 and V sub 2, tabulated in Volume 1 and Volume 2, respectively. (Author)

AD-414 401 Div. 25
(TISTP/PCR) OTS price $3.60

New Hampshire U., Durham.
CONDUCTION THEORIES IN GASEOUS PLASMAS AND SOLIDS.
Final rept., 1 Nov 61-31 Dec 62.
Mar 63, 31p.
Grant AFOSR62 105
AFOSR 5119 Unclassified report

Descriptors: (*Plasma physics, Mathematical analysis), (*Electrical conductance, Theory), Solids, Electromagnetic waves, Fourier analysis, Integral equations, Metals, Superconductors, Magnetic properties, Gases.

The studies were concerned with improving the correlation between theoretical prediction and experimental observation of the transport properties of ionized media. The microwave diagnostic techniques were extended and brought to final completion. With this formulation it is possible to examine in some detail the properties of an anisotropic dielectric or plasma in a geometry which minimizes the effect of boundaries. In addition an attempt was made to ascertain the effect of a modified collision model on the electromagnetic properties of a partially ionized plasma in the presence of a dc magnetic field. The results, while of some theoretical interest, are of negligible practical importance - except possible in the magnetohydrodynamic limit. The primary efforts concerned (a) Interaction between electromagnetic waves and cold plasmas, and (b) Conductivity theory of partially ionized plasmas. (Author)

AD-414 421 Div. 25
(TISTM/EJH) OTS price $22.25

Ohio State U., Columbus.
THE EFFECT OF ADDITIVES ON THE MECHANISM OF DETONATION IN GASEOUS SYSTEMS,
by Bernard T. Wolfson. May 63, 417p.
ARL 63 82 Unclassified report

Doctoral thesis.

Descriptors: (*Detonations, Gases), (*Hydrogen, Detonations), (*Oxygen, Detonations), Additives, Mixtures, Argon, Carbon dioxide, Helium, Pressure, Shock waves, Thermodynamics, Theory, Experimental data, Tables, Bibliography.

This dissertation investigates the effect of He, Ar and CO2 additives on the mechanism of detonation in stoichiometric hydrogen-oxygen mixtures over wide ranges of initial pressures and additive concentrations, and attempts to determine the validity of the Chapman-Jouguet thermohydrodynamic theory under these conditions. No quantitative conclusions can be made about whether complete chemical and/or thermal equilibrium in the Chapman-Jouguet plane was established, or to whether the ''frozen'' or ''equilibrium'' product gas sound speed is most correct in the real gas situation. The detonation velocity was slightly dependent on initial pressure but was critically dependent on mixture composition. The experimental detonation static pressures followed the same general trend as the velocities. The theoretical detonation and shock wave pressures and temperatures increased linearly with initial pressure and were relatively independent of mixture composition. Additives retarded the rate of attainment of stable detonation in stoichiometric hydrogen-oxygen mixtures. (Author)

AD-414 423 Div. 25
(TISTM/TLG) OTS price $9.10

Maryland U., College Park.
SCATTERING FOR THE K(-) MESON FROM THE DEUTERON,
by Anand Kumar Bhatia. Aug 62, 94p. Technical rept. no. 265
Contract AF49 638 24
AFOSR 3501 Unclassified report

Descriptors: (*Meson scattering, Theory), (*K mesons, Scattering), (*Meson bombardment, Nuclear reactions), (*Deutrons, Nuclear reactions), Neutrons, Protons, Meson reactions.

A simple model is constructed to study the scattering of the K(-) meson by deuterons. This model does not treat the nucleon as heavy and takes into account the multiple scattering, the binding energy corrections and the contribution from the off-energy shell scattering. The scattering expansion of the transition-operator t. Considering the multiple scattering up to double order only, the t-matrix is written as:
t = tp + tn + tc + ti, where tp and tn correspond to the single scattering of the K(-) meson from the proton and the neutron in the deutron, tc corresponds to the bound state contribution, and ti corresponds to the continuum state contribution of the K(-) meson from the deutron. The results of this model are compared with the experimental data of the K(-)-d scattering cross sections to study the predictions of this model and to find the favorable Dalitz solution. (Author)

AD-414 429 Div. 25, 14
(TISTP/REB) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE ABSORPTANCE OF A WATER CRYODEPOSIT AT 77 DEGREE K FOR 350 DEGREE K RADIATION,
by T. M. Cunningham, Jr. and R. L. Young.
Aug 63, 18p.
Contract AF40 600 1000, ARO Proj. no. SW2103, Task 895107
AEDC TDR63 155 Unclassified report

Descriptors: (*Thermal radiation, Cryogenics), (*Cryogenics, Films), (*Water, Thermal radiation), Ice, Calorimeters, Cylindrical bodies, Aluminum, Surfaces, Blackbody radiation, Absorption spectrum, Heat transfer, Temperature, Emissivity, Coatings, Determination, Thickness.

The results of an investigation to determine the effect of a water cryodeposit on the radiative properties of two surfaces are presented. The experimental apparatus consisted of a concentric-cylinder calorimeter in which the inner cylinder was a blackbody heater maintained at about 77 K. Data are presented for the total hemispherical absorptance versus the thickness of water frost formed on a vacuum-metallized aluminum surface and on a Parson's black surface. It was found that the absorptance of the cryodeposit-wall complex attained a value of about 0.95 for frost thicknesses on the order of 0.1 mm. For thicknesses greater than 0.1 mm, the absorptance of the complex was found to be independent of the nature of the wall surface in contrast to earlier results for carbon dioxide cryodeposits. (Author)

AD-414 435 Div. 25
(TISTM/AM) OTS price $1.60

Cornell U., Ithaca, N. Y.
RESEARCH ON NEW SOLID STATE DEFECT STRUCTURES

BASED ON WO3 AND ON V2O5.
Final rept.,
by M. J. Sienko. 30 Sep 62, 12p.
Contract AF49 638 191
AFOSR 3911 Unclassified report

Descriptors: (*Solid state physics, Oxides), (*Oxides, Solid state physics), Tungsten compounds, Vanadium compounds, Single crystals, Atomic energy levels, Sodium, Lithium, Copper, Impregnation, Impurities, Bibliographies.

AD-414 469 Div. 25, 20
(TISTM/TCY) OTS price $1.60

Massachusetts Inst. of Tech., Cambridge.
MAGNETIC STUDIES OF IRRADIATED HEMATITE CRYSTALS.
Annual technical rept.
by Robert E. Ogilvie. 22 July 63, 13p.
Contract Nonr1841 84, Proj. NR031 686
Unclassified report

Descriptors: (*Iron compounds, Magnetic moments), (*Oxides, Magnetic moments), (*Ferromagnetic materials, Iron compounds), Transition temperature, Crystal lattice defects, Anisotropy, Magnetic properties, Crystals, Neutron activation, Hysteresis.

A natural crystal of hematite was ground into the form of a sphere about 0.16 inches in diameter. Magnetic measurements by the Curie method have been made before and after irradiation. This crystal was placed in an aluminum container, lined with cadmium to lower the thermal neutron flux and exposed for two periods in the M.I.T. reactor. Only small changes in the magnetic properties occur after a fast flux of 6 x 10 to the 16th power. The hysteresis curves are essentially identical and the magnetization curves at 273 K are similar. There appears to be a slight decrease in saturation moment at 77 K and saturation occurs at higher fields. (Author)

AD-414 494 Div. 25, 2
(TISTP/JP) OTS price $1.60

Harvard Coll. Observatory, Cambridge, Mass.
RESEARCH IN MAGNETOHYDRODYNAMICS AND ITS ASTROPHYSICAL APPLICATIONS.
Final rept.,
by Max Krook. June 63, 10p.
Contract AF19 604 4545, Proj. 8635, Task 86352
AFCRL 63 674 Unclassified report

Descriptors: (*Magnetohydrodynamics, Stars), (*Models (Simulation), Stars), (*Stars, Mathematical models), (*Astrophysics, Magnetohydrodynamics), Solar atmosphere, Magnetic fields, Spheres, Solar disturbances, Thermal radiation.

The immediate aims were to study fundamental magnetohydrodynamic behavior and to evolve more efficient methods for solving the atmospheric structure equations. Keeping in mind the long-range goals of the project, an effort was made to construct dynamical models for stellar atmospheres and, in particular, dynamical models for transient phenomena in such atmospheres. (Author)

AD-414 528 Div. 25
(TISTM/BRW) OTS price $1.60

Group for the Advancement of Spectroscopic Methods, Gams (France).
FAR INFRARED SPECTRA OF CRYSTALS AND SOLIDS IN A LARGE RANGE OF TEMPERATURES.
Annual summary rept,
by J. Lecomte and A. Hadni. 31 May 63, 15p.
Contract AF61 052 518
AFCRL 63 326 Unclassified report

Descriptors: (*Crystals, Spectra (Infrared)), (*Solids, Spectra (Infrared)), (*Absorption spectrum, Cryogenics), Infrared spectroscopy, Low temperature research, Theory, Germanium, Quartz, Aluminum compounds, Silicon compounds, Oxides, Copper compounds, Calcite, Cesium compounds, Tin compounds, Iodides, Fluorides, Gypsium, Calcium compounds, Strontium compounds, Thulium compounds, Chlorides, Mercury compounds, Sodium compounds, Tellurides, Iron compounds, Carbonates, Cyanides.

Far infrared spectra of 11 solids at liquid helium temperature and 7 at room temperature. (Author)

AD-414 530 Div. 25, 9
(TISTP/JP) OTS price $5.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
MOLECULAR KINETICS STUDIES.
by Cord H. Link Jr. Aug 63, 45p.
Contract AF40 600 1000, ARO Proj. Nw2218; 7778, Task 7778011
AEDC TDR63 120 Unclassified report

Descriptors: (*Superaerodynamics, Mathematical models), Transport properties, Thermal radiation, Probability, Matrix algebra, Low pressure research.

A method of calculating molecular flow properties is described, the molecular kinetics (M.K.) method, which is distinctly different from the Monte Carlo method. The M.K. method, based on radiant energy transfer analysis, establishes analogies between radiant energy flux and particle motion for gases in the free molecule regime. It has the advantage of permitting the calculation of final asymptotic values directly from initial conditions once the transfer probability matrix for the specific geometry is known. Flow histories may also be developed by a variation of the method. The general theory is developed, the mathematical operations are described, and applications are shown for selected two- and three-dimensional configurations. (Author)

AD-414 622 Div. 25
(TISTP/MFA) OTS price $2.60

Avco Everett Research Lab., Everett, Mass.
MAGNETOHYDRODYNAMIC SHOCK STRUCTURE IN A PARTIALLY IONIZED GAS.
by E. T. Gerry, R. M. Patrick, and H. E. Petschek.
June 63, 19p. Research rept. 153
Contracts AF49 638 1129 and Nonr252400
Unclassified report

Descriptors: (*Magnetohydrodynamics, Shock waves), (*Gas ionization, Hydrogen), (*Plasma medium, Measurement), Ions, Viscosity, Thermal conductivity, Temperature, Theory, Shock tubes, Momentum, Energy, Molecular properties, Number theory, X-rays, Light, Intensity, Propagation.

A study has been made of strong MHD shock waves in partially ionized hydrogen. Dissipation due to slip between the ions and neutrals with the effects of viscosity and heat conductivity have been included. Charge exchange processes control viscosity and ion slip. For Alfven Mach numbers below 2.5, the dominant mechanism is ion

slip; for larger Mach numbers, the viscosity is important. The measured light intensity rise time and the electron temperature immediately behind the shock agree with theory. Behind the shock, measured electron temperatures are low. Electron temperatures are obtained by measuring the plasma soft x-radiation using thin carbon foils as filters. (Author)

AD-414 626 Div. 25
(TISTP/FEM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE TEMPERATURE CALCULATION OF AN ORTHOTROPIC PLATE WITH TRANSVERSE SHEAR TAKEN INTO CONSIDERATION.
by S. M. Durgar'yan. 19 June 63, 12p.
FTD TT63 529 Unclassified report

Trans. from Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, no. 6, pp. 154-160, 1962.

Descriptors: (*Sheets, Temperature), (*Elasticity, Materials), Shear stresses, Differential equations, Integration, Partial differential equations, Numerical analysis, Cylindrical bodies, Thickness, Deformation, Heat transfer, Thermal expansion.

A rectangular orthotropic plate of constant thickness h referred to rectangular cartesian coordinates is examined. The coordinate plane xoy is combined with the average plane of an undeformed plate, the coordinate axes are directed along the principal directions of elasticity of the plate material, and the coordinate origin is set at one of the apexes of the plate. The deformation factors and the thermal coefficients of expansion are considered as given functions of temperature T, changing according to a known law. (Author)

AD-414 628 Div. 25
(TISTP/JP) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LIGHT COUNTS OF KILOMETERS.
by Rudol'f Svoren'. 26 June 63, 3p.
FTD TT63 648 Unclassified report

Trans. from Sovetskaya Kirgiziya, p. 4, 15 Nov 1962.

Descriptors: (*Range finding, Light pulses), (*Light transmission, Measurement).

The instrument is altogether not similar to conventional range finders - it rather resembles a radar set. The basic difference here lies in the fact that instead of radio waves the range finder uses a beam of light. (Author)

AD-414 658 Div. 25, 15
(TISTP/WH) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
LAMBERT'S EQUATIONS REVISITED,
by S. R. Marcus. 22 July 63, 23p. Rept. no. TDR169 3550 40TN3
Contract AF04 695 169
Unclassified report

Descriptors: (*Celestial mechanics, Orbital trajectories), (*Orbital trajectories, Celestial mechanics), Analytic geometry, Equations, Motion.

Lambert developed equations relating times of transit between two points in space and the semimajor axis of conics passing through these two points when the two radii and the chord are given. Special types of problems can often best be solved by alternate methods that have been developed, but for a general study of connecting two points in space with a conic section, with nno special constraints other than time, Lambert's equations seem to be best suited. This paper represents an expository summary of the mathematical methods and techniques involved. (Author)

AD-414 692 Div. 25
(TISTP/FEM) OTS price $5.60

High Energy Physics Lab., Stanford U., Calif.
ELECTRON-PROTON COINCIDENCES IN INELASTIC ELECTRON DEUTERON SCATTERING,
by M. G. Croissiaux. June 62, 52p. HEPL Rept. no. 264
Contract N6onr25116
Unclassified report

Technical Report Linear Electron Accelerator Project.

Descriptors: (*Electron accelerators, Scattering), (*Inelastic scattering, Electrons), Spectroscopy, Deuterons, Protons, Proton counters, Energy, Momentum, Electron beams, Deuteron cross sections, Magnetic properties, Spectrophotometers, Electronic equipment, Refractive index, Photomultipliers.

The presence of two magnetic spectrometers in the end station of a linear accelerator has opened a new field of research in electron scattering problems. The problem of e-p coincidences in deuterium is being studied with the detection of relatively energetic protons (above 50 Mev). The neutron form factors can be obtained more easily from the measurement of the e-n coincidence (with the detection of high-energy neutron) or the coincidence e-p (with low-energy proton, less than 10 Mev). The experiment discussed here is an attempt to find a value for the proton form factors in a bound state and see if they are equal to those obtained for a free proton. (Author)

AD-414 708 Div. 25
(TISTP/WH) OTS price $16.00

Northwestern U., Evanston, Ill.
PARTITION FUNCTIONS AND THERMODYNAMIC PROPERTIES OF ARGON PLASMA,
by K. S. Drellishak, C. F. Knopp and Ali Bulent Cambel. Aug 63, 238p.
Contract AF40 600 748
AEDC TDR63 146 Unclassified report

Descriptors: (*Plasma physics, Argon), (*Particles, Energy), Enthalpy, Entropy, Ions, Electrons, Functions, Thermodynamics, Tables, Programming (Computers).

Using tabulated data for observed atomic energy levels plus estimated energies for levels which are predicted but not observed, the internal partition functions for the argon atom and the first four argon ions were calculated on an IBM 709 computer. The partition functions were terminated by application of the Debye cutoff criterion and a corresponding lowering of the ionization potential was included. Assuming a mixture of six perfect gases (electrons, argon atoms, and argon ions) the equilibrium composition, internal partition functions and thermodynamic properties were calculated and tabulated for five pressures (0.1, 0.5, 1.0, 2.0, and 5.0 atmospheres) at 100 K increments for a range of temperatures from 5000 to 35000 K. The tables

and figures include internal partition functions, composition, density, entropy, internal energy, enthalpy, Gibbs and Helmholtz potentials, specific heats at constant pressure and volume, the effective gamma and equilibrium sound speed. (Author)

AD-414 715 Div. 25
(TISTP/WH) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
VAPORIZATION OF SOLIDS BY ABSORBED RADIATION ENERGY,
by E. M. Shakhov. 10 May 63, 23p.
FTD TT63 77 1 2 Unclassified report

Trans. from Inzhenernyy Zhurnal, 1:4, pp. 27-38, 1961.

Descriptors: (*Solids, Vaporization), (*Thermal radiation, Solids), Absorption, Physical chemistry, Boundary layer, Surfaces, Ablation.

AD-414 716 Div. 25
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Calif.
STEADY-STATE CONDITIONS OF HIGH-TEMPERATURE PLASMA. A PINCH IN A LONGITUDINAL MAGNETIC FIELD,
by E. F. Tkalich and V. S. Tkalich. 21 May 63, 16p.
FTD TT63 373 Unclassified report

Trans. from Zhurnal Tekhnicheskoy Fiziki, 32:12, pp. 1418-1427, 1962.

Descriptors: (*Magnetic pinch, Plasma physics), (*Plasma physics, Magnetic pinch), Electric currents, Magnetic fields, High temperature.

Steady-state conditions of high-temperature plasma are studied in a kinetic approximation. We investigate the radial distribution of density, azimuthal current, and other macroscopic physical values in a pinch with longitudinal magnetic field. (Author)

AD-414 719 Div. 25
(TISTP/MFA) OTS price $4.60

Towne School of Civil and Mechanical Engineering, U. of Pennsylvania, Philadelphia.
THEORY OF MECHANICAL BEHAVIOR OF HETEROGENEOUS MEDIA,
by Zvi Hashin. July 63, 39p. Technical rept. no. 3
Contract Nonr55142
Unclassified report

Descriptors: (*Mechanical properties, Analysis), (*Crystals, Stresses), (*Materials, Deformation), Anisotropy, Continuum mechanics, Statistical distributions, Probability, Isotropism, Viscoelasticity, Symmetry (Crystallography), Bibliographies, Plasticity, Shear stresses, Theory.

A review of theoretical methods and results in the field of prediction of bulk mechanical properties of heterogeneous media, in terms of mechanical properties and geometry of constituents is presented. The term heterogeneous medium is here understood as a mixture of discrete homogeneous phases which form regions that are large enough to be regarded as continua. The mechanical behavior of each phase is known in terms of stress-strain relations and at phase interfaces usual continuity conditions on stress vectors and displacements (or velocities) are specified. (Author)

AD-414 739 Div. 25
(TISTP/JP) OTS price $1.60

Emmanuel Coll. Research Language Center, Boston, Mass.
A MASS SPECTROMETER FOR INVESTIGATING THE PROCESSES WHICH OCCUR WHEN ELECTRONS AND IONS COLLIDE WITH MOLECULES (Mass spektrometr dlia issledovaniia protsessov, proiskhodiashchikh pri stolkoveniiakh elektronov i ionov s molekulami),
by E. L. Frankevich and V. L. Tal'roze, tr. by Zanis Stuberovskis. Mar 63, 14p. Rept. no. E - T - R - 63 - 7
Contract AF19 604 8505
Unclassified report

Trans. from Pribory i Tekhnika Eksperimenta, Vol. 2, pp. 48-53, 1957.

Descriptors: (*Mass spectroscopy, Instrumentation), Ion beams, Ionic current, Electrodes, Electron gun, Mass spectrum, Ions, Scattering, Molecules, Electrons, Electron multiplier, Pulse generators, Energy.

A mass spectrometer designed for investigation by the electron and ion impact method is described here. Ionizing electrons are ''quasimonochromatized'' by introducing a retarding electrode into the electron gun whose potential is modulated by an alternating voltage with a low amplitude and a 10 Hertz frequency. The ion current is amplified by a resonance amplifier on this same frequency. An electron multiplier is used for primary amplification of the ion current. Measures are taken to collect an ion beam with a large solid angle. The retarding potential method is used to measure the primary kinetic energy of ions. (Author)

AD-414 740 Div. 25
(TISTP/JP) OTS price $1.60

Emmanuel Coll., Research Language Center, Boston, Mass.
TEMPERATURE RELATION OF THE MAGNETOSTRICTION OF SATURATION OF IRON SILICIDE MONOCRYSTALS (Temperaturnaia Zavisimost' Magnitostriktsii Nasyshcheniia Monokristallov Kremnistogo Zheleza),
by A. Ia. Vlasov and I. L. Gus'kova, tr. by Richard M. Holden. Mar 63, Rept. no. ETR63 4
Contract AF19 604 8505
Unclassified report

Trans. from Izvestiia vysshikh uchebnykh zavedenii, Fizika, vol. 5, pp. 156-160, 1962.

Descriptors: (*Magnetostriction, Temperature), (*Single crystals, Magnetostriction), Iron compounds, Silicides, Deformation, Ferromagnetism, Ferromagnetic materials, Crystal structure, Anisotropy.

The magnetostriction constants of iron silicide monocrystals (3.5% Si) for the axes 100, 110, and 111 in plane 110 and their changes in the temperature interval from -196 to 800 C are determined. The domain structure of the investigated samples are also examined. (Author)

AD-414 767 Div. 25
(TISTP/JP) OTS price $1.60

Maryland U., College Park.
STEADY-STATE DIFFUSION THROUGH A FINITE PORE INTO AN INFINITE RESERVOIR: AN EXACT SOLUTION,
by R. B. Kelman. Aug 63, 10p. Technical note BN328
Contract Nonr595 17
Unclassified report

Descriptors: (*Diffusion, Mathematical analysis), Porosity, Transport properties, Evaportranspiration.

An outline is given of an analysis that leads to an exact solution for the problem of steady-state diffusion through a finite thick pore into an infinite region surrounding the mouth of the pore. From this exact formula a simple expression for the flux is derived. This expression approximates the flux with a relative error of less than 3.42% independently of the ratio of the length of the pore to its radius. If desired more accurate expressions for the flux can be obtained from the exact solution. (Author)

AD-414 833 Div. 25
(TISTP/HG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF CONVERTING AN AM SIGNAL INTO A QUANTIZED PULSE-DURATION-MODULATED SIGNAL,
by B. I. Nosov. 22 June 63, 3p.
FTD TT63 432 Unclassified report

Trans. from Patent nr. 147255, (Appl. Nr. 697013/26, pp. 1-2, 1961.

Descriptors: (*Signals, Amplitude modulation), Pulse modulation, Transformations (Physical), Electromagnetic pulses, Switching circuits, Communication theory, Commutators.

AD-414 834 Div. 25
(TISTM/EJH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
APPLICATION OF THE SIMILARITY METHOD TO INVESTIGATE THE MOVEMENTS OF POWERFUL BEAMS OF CHARGED PARTICLES IN HIGH VOLTAGE ELECTROSTATIC FIELDS,
by A. K. Val'ter and V. Ye. Finkel'shteyn.
25 July 63, 9p.
FTD TT63 514 Unclassified report

Trans. from Uchennyye Zapiski Khar'kovskogo Universiteta (Trudy), 6:64, pp. 95-100, 1955.

Descriptors: (*Particle beams, Electrostatic fields), (*Ion beams, Particle beams), (*Electrostatic fields, Particle beams), Mathematical analysis, Differential equations, Particle trajectories, Electric currents, Density.

AD-414 835 Div. 25
(TISTP/WH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PROBLEMS OF HEAT TRANSFER IN RAREFIED GASES,
by L. Ye. Kalikhman. 18 June 63, 4p.
FTD TT62 978 Unclassified report

Trans. from Soveshchaniye po Teplo i Massoobmenu, Minsk, Tezisy Dokladov i Soobshcheniy, pp. 31-32, 1961.

Descriptors: (*Heat transfer, Convection), (*Gases, Heat transfer), Thermodynamics, Enthalpy, Entropy.

AD-414 839 Div. 25, 17
(TISTM/AMS) OTS price $3.60

Alloyd Corp., Cambridge, Mass.
INFLUENCE OF CARBON CONTENT AND SUBSTRUCTURE ON CLEAVAGE IN IRON SINGLE CRYSTALS,
by D. A. Hay and B. L. Averbach. Apr 62, 32p.
Contracts AF33 616 6454 and AF33 616 7091, Proj. 7021
ASD TR61 686, pt. 1 Unclassified report

Descriptors: (*Iron, Single crystals), Carbon, Transition temperature, Ductility, Brittleness, Tests, Fracture (Mechanics), Crystals, X-ray diffraction analysis, Crystal lattice defects, Density, Low temperature research, Tensile properties, Test methods, Metallography, Shear stresses, Stresses, Temperature, Grain boundaries, Microstructure.

The influence of substructure and carbon content on the ductile-brittle transition temperature were studied in iron single crystals. It was found that increases in carbon content (from 0.0005% to 0.030%) raised the transition temperature considerably. Small amounts of prestraining at room temperature before sub-zero testing inhibited twin formation. In cases where twins were formed, many micro-cracks were found in twins and at twin boundaries in fractured crystals. In some cases, micro-cracks were also found in the matrix of fractured crystals. (Author)

AD-414 847 Div. 25, 8
(TISTM/EJH) OTS price $3.60

Electronic Properties Information Center, Culver City, Calif.
INDIUM PHOSPHIDE. DATA SHEETS,
by M. Neuberger. June 62, 29p. Rept. no. DS102
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Semiconductors, Data), (*Indium alloys, Data), (*Phosphorus alloys, Data), Absorption spectrum, Spectra (Infrared), Electrical conductance, Hall effect, Refractive index, Reflection, Photons, Electrical properties, Magnetic properties, Neutron reactions.

AD-414 853 Div. 25, 8
(TISTP/FEM) OTS price $2.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
PIEZOELECTRIC COUPLING BETWEEN ULTRASONIC WAVES AND FREE ELECTRONS IN CADMIUM SULFIDE,
by Kenneth W. Nill. July 63, 20p. Technical rept. no. 181
Contract Nonr184110
Unclassified report

Descriptors: (*Piezoelectric effect, Semiconductors), (*Ultrasonic properties, Phonons), Scattering, Electrons, Electric currents, Crystal lattices, Attenuation, Electric fields, Space changes, Cadmium compounds, Sulfides, Energy conversion, Propagation, Equations.

In some semiconductors there is strong coupling between lattice waves and free electrons due to the piezoelectric effect. This coupling provides an energy-exchange mechanism from the electron system to the lattice system. This transfer is experimentally observed here as the amplification of an ultrasonic wave and as an acoustoelectric current resulting from the wave-electron drag. Experimental results are presented which support an acoustoelectric-effect explanation of a kink in the current-voltage characteristics of piezoelectric semiconductors. (Author)

Division 25 - PHYSICS

AD-414 864 Div. 25
(TISTP/FEM) OTS price $4.60

Aerophysics Lab., Mass. Inst. of Tech., Cambridge.
A ONE-DIMENSIONAL MODEL FOR COMPRESSIBLE FLOW IN THE TRAVELING WAVE PUMP,
by Eugene E. Covert and Charles W. Haldeman.
May 63, 38p.
Contract AF33 657 7975, Proj. 7065, Task 706501
ARL 63 83 Unclassified report

Descriptors: (*Travelling wave electron accelerators, Models (Simulations)), (*Compressible flow, Numerical analysis), Differential equations, Integrals, Magnetic fields, Plasma medium, Viscosity, Velocity, Numerical methods and procedures, Bessel functions.

One possible technique for accelerating a plasma to a high Mach number is that of passing a magnetic field through the plasma. This technique, called the traveling wave pump, is characterized by a complicated set of differential equations. These equations have been approximtated by a one-dimensional steady state form. Several approximate integrals are found for the one-dimensional equations. The results indicate that the viscosity losses in the system are not excessive. The results also indicate that the inlet velocity profile should be as uniform as possible and that the magnitude of the inlet velocity should exceed gamma-1/gamma times the wave speed by an appreciable amount. (Author)

AD-414 878 Div. 25
(TISTP/WH) OTS price $5.60

Massachusetts Inst. of Tech., Cambridge.
EXPERIMENTAL DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF NOBLE GAS-ALKALI METAL PLASMAS,
by Frank C. Halstead and Eugene L. Larson.
Aug 63, 49p.
Unclassified report

Thesis submitted in Partial Fulfillment for Degrees of Master of Science and Engineer of Aeronautics and Astronautics.

Descriptors: (*Plasma physics, Electrical conductance), (*Electrical conductance, Plasma physics), Argon, Potassium, Electrons, Temperature, Theory, Magnetohydrodynamics, Generators, Determination.

The electrical conductivity of an argon-potassium plasma has been successfully measured. The experimental results indicate that the temperature of the electrons is elevated above the temperature of the electrons is elevated above the temperature of the plasma. It is shown that the two temperature theory is correct as a first estimate of the conductivity of the plasma. Joule heating, conduction and radiation heat losses, varying collision cross sections, thermionic emission, and non Maxwellian electron energy distribution cause the theory to differ from the experimental results. A successful method of measuring the electron temperature in the plasma has been devised using simple temperature measurement definitely proves the two temperature plasma theory. (Author)

AD-414 895 Div. 25
(TISTM/EJH) OTS price $1.60

Electronic Properties, Information Center, Culver City, Calif.
MAGNESIUM SILICIDE. DATA SHEETS,
by M. Neuberger. June 62, 14p. Rept. no. DS104
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Semiconductors, Data), (*Magnesium alloys, Data), (*Silicon alloys, Data), Electrical conductance, Hall effect, Resistance (Electrical), Bibliography.

AD-414 896 Div. 25
(TISTM/EJH) OTS price $3.60

Electronic Properties Information Center, Culver City, Calif.
INDIUM TELLURIDE. DATA SHEETS,
by M. Neuberger. June 62, 27p. Rept. no. DS103
Contract AF33 616 8438, Proj. 7381, Task 738103
Unclassified report

Descriptors: (*Semiconductors, Data), (*Indium alloys, Data), (*Tellurium alloys, Data), Absorption spectrum, Electrical conductance, Thermal conductivity, Hall effect, Resistance (Electricity), Temperature.

AD-414 915 Div. 25, 14
(TISTM/AMS) OTS price $2.60

Torino U. (Italy).
''CARRIER-INJECTION ELECTROLUMINESCENCE IN ZnS SINGLE CRYSTALS.'' PART 3.
Final rept.,
by G. Bonfiglioli, P. Brovetto, C. Cortese and A. Suardo. Apr 63, 27p.
Contract AF61 052 328
AFOSR 4865 Unclassified report

Descriptors: (*Zinc compounds, Sulfides), (*Electroluminescence, Single crystals), Injection, Copper, Impurities, Absorption spectrum, Equations, Mathematical analysis, Photoelectric cells (Semiconductor), Phosphorescent materials.

AD-414 950 Div. 25
(TISTP/WH) OTS price $6.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
WHISTLER MODE-IONIZED STREAM INTERACTIONS. PART I,
by O. E. H. Rydbeck and J. Askne. 15 June 63, 56p.
Scientific rept. no. 187
Contract AF19 604 4563, Proj. 8605, Task 860502
AFCRL 63 482 Unclassified report

Report on Ionospheric Research.

Descriptors: (*Radio waves, Low frequency), (*Exosphere, Radio waves), (*Whistlers, Exosphere), (*Ions, Space charges), Cyclotron resonance phenomena, Cyclotron waves, Propagation.

Contents: Whistler mode-stream interaction when the wave normal and the stream are parallel to the static magnetic field (the longitudinal case); Whistler mode-stream interaction when the wave normal makes an angle theta with the stream and the static magnetic field; Discussion of the various gamma-values as functions of theta and Y; The wave propagation properties of the moving magneto-ionic medium; Whistler mode-stream interaction when the static magnetic field makes an angle theta, and the ionized stream another angle with the wave normal.

AD-414 952 Div. 25
(TISTP/FR) OTS price $2.60

Army Cold Regions Research and Engineering Lab., Hanover, N. H.
EFFECTIVE THERMAL CONDUCTIVITY OF VENTILATED SNOW,
by Yin-Chao Yen. Feb 63, 14p.
CRREL Research rept. 103
Unclassified report

Descriptors: (*Snow, Thermal conductivity), Thermal conductivity, Measurement, Instrumentation, Temperature, Heat transfer, Gas flow, Air.

Thermal conductivities of unconsolidated snow particles with air flowing in a direction parallel but opposite to the energy flow have been investigated for the mass flow rate ranging approximately from 10 to 40 times 10 to the -4 g/sq cm-sec based on the total cross-sectional area of the flask containing the snow sample. The results are interpreted as being the effective thermal conductivity of snow. In the experimental range for snow densities from 0.376 to 0.472 g/cu cm and corresponding snow particle sizes of 0.07 to 0.22 cm nominal diameter, the results can be represented well by the following least-squares equation, k sub e = 0.0014 + 0.58 G where k sub e is the effective thermal conductivity of sknow in cal/cm-sec-C and G is the mass flow rate of dry air in g/cu cm-sec. When there is no flow, or G = 0, k sub e reduces to a constant value of 0.0014 cal/cm-sec-C, equivalent to the thermal conductivity of snow with motionless fluid. The value of 0.0014 is in good agreement with the data reported by Abel's (1893) and Kondrat'eva (1945). (Author)

AD-414 981 Div. 25, 2
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson, Air Force Base, Ohio.
NEWS FROM SCIENCE AND TECHNOLOGY,
23 July 63, 5p.
FTD TT63 641 1 Unclassified report

Trans. from Fizika V Shkole, No. 1, pp. 32-33, 1957.

Descriptors: (*High-pressure research, Reviews), (*Upper atmosphere, Rockets).

AD-414 986 Div. 25
(TISTM/ODN) OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
STRESS RELAXATION OF MONO AND POLYDISPERSE POLYSTYRENE,
by A. V. Tobolsky, H. Schaffhauser and R. Bohme.
Aug 63, 6p.
Contract Nonr185807, Proj. NR356 377
ONR TR RLT 63 Unclassified report

Descriptors: (*Styrene plastics, Stresses), (*Stresses, Relaxation time), Elasticity, Polymers, Viscosity, Shear stresses, Viscoelasticity.

AD-414 997 Div. 25, 30
(TISTM/EJH) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON A POSSIBLE METHOD OF MEASURING CONCENTRATIONS OF IONS, GENERATED BY HYDROIONIZERS,
by M. I. Korsunskiy, M. B. Reznik and R. M. Truten'. 14 Aug 63, 7p.
FTD TT63 666 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy Fizika, No. 6, pp. 152-156, 1962.

Descriptors: (*Ions, Measurement), (*Radiation measurement systems, Ions), (*Ion beams, Radiation measurement systems), Ionization, Mass spectrum.

AD-415 003 Div. 25, 9
(TISTP/WH) OTS price $18.00

Chicago U., Ill.
INVESTIGATION OF THE EFFECTS OF AN AXIAL MAGNETIC FIELD ON THE FLOW OF AN IONIZED GAS.
Rept. for 15 June 58-30 June 62,
by Philip J. Dickerman, Trinidad J. Jaramillo and Verner J. Raelson. July 63, 276p.
Contract AF33 616 8048, Proj. 7063, Task 7063 01
ARL 63 131 Unclassified report

Report on Mechanics of Flight.

Descriptors: (*Magnetohydrodynamics, Ions), (*Ions, Magnetic fields), Gas flow, Gas ionization, Heat transfer, Ducts, Plasma physics, Generators.

The influence is investigated of an axial magnetic field on the flow properties and heat transfer characteristics of a partially ionized gas in a cylindrical flow channel. Work performed includes assembly and calibration of the experimental equipment, results of heat transfer measurements as a function of magnetic field strength, experimental determination of flow parameters in the channel, and a theoretical description of the problem along with a correlation with experimental results. (Author)

AD-415 005 Div. 25
(TISTM/AMS) OTS price $2.60

Mitre Corp., Bedford, Mass.
ON THE DYNAMIC RESPONSE OF THIN CYLINDRICAL SHELLS TO IMPULSIVE LOADING,
by L. J. Mente. Aug 63, 22p. Rept. no. TM3432
Contract AF33 600 39852, Proj. 600 8
ESD TDR63 258 Unclassified report

Descriptors: (*Cylindrical bodies, Buckling (Mechanics)), Theory, Geometric forms, Loading (Mechanics), Dynamics, Elasticity, Equations, Deformation, Panels (Structure), Nuclear explosion damage, Mathematical analysis.

This paper contains the development of the theory required to study the large displacements of thin, cylindrical shells in the post-buckling region under impulsive loading. An approximate energy analysis is postulated in which the Lagrangian equations of motion are derived, based on an assumed number of degrees-of-freedom for the shell. These governing equations are established within the framework of the large displacement theory for cylindrical shells, based on the Kirchkoff-Love and small-strains assumptions. The formulation of the equations of motion and initial conditions for cylindrical panels are presented in nondimensional form. (Author)

Division 25 - PHYSICS

AD-415 014 Div. 25, 9
(TISTP/WH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AMPLIFICATION OF SHOCK WAVES IN THEIR PASSAGE THROUGH A FLAME FRONT.
by G. A. Salamandra and I. K. Sevast'yanova.
19 July 63, 10p.
FTD TT 63 532 Unclassified report

Trans. from AN SSSR Energeticheskiy Institut, Fizicheskaya Gazodinamika, Teploobmen I Termodinamika Gazov Visokikh, Moskva, pp. 199-203, 1963.

Descriptors: (*Shock waves, Flames), (*Flames, Shock waves), Amplifiers, Combustion, Ignition, Explosion gases, Explosions.

The process of the formation of the shock wave before a flame front in the case of combustion within closed compartments and to the explanation of their role in the further development of the process of combustion is studied. (Author)

AD-415 015 Div. 25
(TISTM/EJH) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE DOPPLER EFFECT WHEN MOVING THROUGH A HETEROGENEOUS MEDIUM,
by G. D. Yakovleva, O. I. Yakovlev, and A. I. Rogashkova. 25 July 63, 11p.
FTD TT63 673 1 2
Unclassified report

Trans. from Radiotekhnika i Elektronika, 8:3, pp. 416-424, 1963.

Descriptors: (*Doppler effect, Theory), Dielectrics, Electromagnetic waves, Mathematical analysis, Integral equations, Frequency.

A method of analyzing the Doppler effect during movement of a receiver through a heterogeneous medium, when the change in dielectric permeability of the medium is little different from that of the surrounding space is reported. An expression is given for the Doppler change in frequency when the receiver moves in a heterogeneity, having cylindrical and spherical form. A statistically heterogeneous medium is discussed. (Author)

AD-415 021 Div. 25
(TISTP/MFA) OTS price $2.60

Oregon U., Eugene.
ARE BLOCH BANDS AT FINITE ELECTRIC FIELD ADIABATICALLY CONNECTED TO THOSE AT ZERO FIELD,
by G. H. Wannier and J. P. VanDyke. 1962, 20p.
TR2
Contract NONR2771 05, Proj. NR017 633
Unclassified report

Descriptors: (*Electric fields, Analysis), (*Particles, Motion), Functions, Numerical analysis, Transformations (Mathematics), Taylor's series.

It has been shown previously that if a potential consists of a superposition of a periodic part and a uniform electric field then for a particle moving in this field there are Bloch bands closed in time. The question is raised whether Bloch bands may be identified with field-free bands. The most natural thing is to expect that the bands are slightly field dependent, but converge toward the field-free bands as E goes to zero. Bands for which this is true are said to be adiabatically connected to corresponding bands at zero field. In part 2, two model cases are given for which this adiabatic connection pertains. Part 3 provides the conclusion that the answer to the question in the report title is almost always negative. Part 4 provides an explicitly soluble case which does not allow adiabatic connection. An infinite number of field values E converging toward zero are found at each of which the two bands under consideration switch identity (hyperbolic rather than linear connection at energy crossing). The connection postulated in the effective mass approximation must therefore be a non-adiabatic nature. (Author)

AD-415 031 Div. 25
(TISTP/WH) OTS price $4.60

Pennsylvania State U., Mineral Industries Experiment Station, University Park.
PRELIMINARY INVESTIGATIONS OF POROUS FLOW-THROUGH ELECTRODES OF PLATINUM BLACK,
by P. Palasi and L. G. Austin. May 63, 1v.
Rept. no. 4
Contract DA49 186 5020RD917
Unclassified report

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Porous materials), (*Platinum, Porous materials), Chemical reactions, Catalysts, Electric power production, Organic materials, Hydrazine, Ammonia, Borohydrides, Peroxides, Potassium compounds, Nitric acid, Hydrazine peroxide.

Half cell studies were made on four fuels and two oxidants, using a porous flow-through electrode system. The electrode studied consisted of a sandwich of platinum black between platinum screens. The fuels tested were methanol, hydrazine, ammonia and potassium borohydride; the oxidants tested were hydrogen peroxide and nitric acid. All of the reactants were capable of producing current densities of several hundred milliamps/sq cm at reasonable voltages, but hydrogen peroxide suffered from instability. The results were qualitatively in agreement with the simple theory of porous flow-through electrodes, but were not in quantitative agreement. Some discussion of the reasons for departure from the theory are given. A later report will investigate one fuel in more detail in order to clarify the theory of operation. (Author)

AD-415 113 Div. 25
(TISTP/JP) OTS price $1.60

Stanford U., Calif.
(No title).
Final rept.
23 May 63, 11p.
Contract AF49 638 388
AFOSR 4977 Unclassified report

Descriptors: (*Quantum mechanics, Bibliographies), (*Nuclear physics, Bibliographies), (*Relativity theory, Bibliographies).

AD-415 125 Div. 25
(TISTM/EJH) OTS price $8.10

RAND Corp., Santa Monica, Calif.
TRANSIENT SOUND PROPAGATION IN A SIMPLE MODEL OF A TRIPLE-LAYERED MEDIUM,
by Allan D. Pierce. Apr 63, 84p. Memo. RM3478
Unclassified report

Descriptors: (*Sound transmission, Mathematical analysis), Atmosphere, Wave transmission, Electromagnetic waves, Nuclear explosions, Integral equations.

A study was made of the transient sound propagation from a point source in a triple-layered medium consisting of a homogeneous fluid layer sandwiched between 2 similar half spaces of the same density but of higher sound speed. The source spectrum is such that a large number of normal modes are excited. Source and receiver are assumed to be in the same half space. The general solution consists of a direct wave, a wave reflected from the near edge of the center layer, a lateral wave, and the normal and complex mode waves. At large distances the normal mode waves dominate. One may relate frequency, phase velocity, group velocity, and excitation amplitudes parametrically, and, on this basis, the variation of the characteristics of the normal modes with mode number n is studied. Similar methods can be used to study the complex modes. Each normal mode is found to carry a limited band of frequencies--the band width for higher order modes being approximately proportional to n to the -1 power. On the basis of the study, one may give a qualitative description of the waveforms. (Author)

AD-415 127 Div. 25
(TISTM/TLG) OTS price $3.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
HYPERVIRIAL FUNCTIONS AND THE POSITIVE POWERS OF THE RADIAL COORDINATE OPERATOR IN He AND H(-),
by S. L. Gordon. 10 June 63, 35p. WIS TCI18
Contract AF33 657 7311
Unclassified report

Descriptors: (*Helium, Atomic properties), (*Hydrogen, Atomic properties), (*Electrons, Particle trajectories), (*Perturbation theory, Atomic properties), Atoms, Partial differential equations, Ions, Excitation.

Ground state He and H(-) trial functions are scaled to satisfy the hypervirial relations generated by a family of hypervirial operators. These one-parameter hypervirial functions are used to calculate expectation values of positive powers of the radial coordinate operators. The values are also calculated through first order using the perturbation techniques of Dalgarno and coworkers. The perturbation treatment gives excellent results for He, but is ineffective for H(-). The hypervirial theorem is used to develop a variety of expectation value relationships for one and two electron central force problems. (Author)

AD-415 128 Div. 25
(TISTM/TLG) OTS price $1.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE METHOD OF P-ANALYTIC FUNCTIONS IN THE AXIAL SYMMETRY THEORY OF ELASTICITY.
by G. M. Polozhiy. 12 Aug 63, 2p.
RSIC 45 Unclassified report

Trans. from Naukovyi Shchorichnyk, Kievsky Dyerzhavny Universitet, pp. 529-5e30, 1956.

Descriptors: (*Elasticity, Theory), Functions.

AD-415 141 Div. 25, 2
(TISTP/FEM) OTS price $9.10

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
STUDY OF ATMOSPHERIC ENTRY AND IMPACT OF HIGH-VELOCITY METEORITES (LARGE-SCALE ELECTRON-PROBE MEASUREMENTS OF METEORITES).
Final rept.,
by F. Behn Riggs, Jr. 1963, 94p.
Contract AF18 600 1596
AFOSR Rept. no. 5079 Unclassified report

Descriptors: (*Meteorites, Ablation), (*Electron beams, Meteorites), Atmosphere entry, Metallography, Chemical properties, X-ray diffraction analysis, Crystal structure, Optical properties, Vacuum apparatus, Electronic equipment, Lenses, Electronic guns, Particles, Spectrophotometers, Etched crystals, Photographs, Metals, Chemicals.

AD-415 157 Div. 25
(TISTP/HG) OTS price $7.60

Moore School of Electrical Engineering, U. of Pennsylvania, Philadelphia.
FEASIBILITY STUDIES OF POYNTING VECTOR MEASUREMENTS.
Interim rept. no. 4, 1 Apr-30 June 63,
by R. A. Bartfeld, R. G. Mulholland and P. B. Swarup. 31 July 63, 68p. Moore School rept. no. 63 23
Contract NBy32219
Unclassified report

Descriptors: (*Electromagnetic fields, Feasibility studies), (*Electromagnetic properties, Measurements), Electrical impedances, Power, Energy, Dipole antennas, Loop antennas, Phase shifters, Phase measurement, Partial differential equations, Integral equations, Functions, Special functions, Bessel functions, Errors.

Feasibility studies of Poynting vector measurements were undertaken as a result of previous studies concerning methods of improved measurements in the near field of radiating sources. In previous reports it was indicated that a new type of near field measurement, the Poynting vector measurement, has some distinct advantages over presently used methods. The present study concerns itself with the feasibility of those measurements and a demonstration of the principle involved. (Author)

AD-415 164 Div. 25, 20
(TISTP/AM) OTS price $7.60

Columbia Radiation Lab., New York.
RESEARCH INVESTIGATION DIRECTED TOWARD EXTENDING THE USEFUL RANGE OF THE ELECTROMAGNETIC SPECTRUM.
Quarterly progress rept. no. 2, 16 Mar-15 June 63,
by R. Novick. 15 June 63, 66p.
Contract DA36 039sc90789, Task 3A99 20 001 09
Unclassified report

Descriptors: (*Cadmium, Isotopes), (*Magnetic moments, Cadmium), (*Nuclear spins, Cadmium), Bibliographies, Atomic spectroscopy, Reports, Cryogenics, Helium, Lasers, Spectrophotometers, Life expectancy, Ruby, Data, Test equipment, Lithium, Atomic energy levels, Ionizations, Color centers, Solid state physics, Radio astronomy.

The nuclear spin and magnetic moment of 55 hour Cd115 have been determined by optical double resonance. Positive identification of the isotope was obtained by the observation of the decay

of the resonances. The atomic g factor for the (5s5p)3p1 state of Cd has been determined to 10 ppm with a K band optical double resonance spectrometer. Metastable autoionizing states have been discovered in potassium and rubidium and it has been shown that these can be quenced with an electric field (Stark quenching). The hyperfine structure of the (4s4p)3p1 state of Zn67 has been redetermined. Level crossings have been detected in the (3d)54p and (3d)44s4p configurations of chromium; the lifetimes of these states were determined from the widths of the crossing resonances. (Author)

AD-415 179 Div. 25, 15
(TISTP/HG) OTS price $10.50

Little, Arthur D., Inc., Cambridge, Mass.
ANALYTICAL BACKGROUND OF COMPUTATIONAL METHODS FOR UNDERWATER SOUND PROPAGATION.
June 62, 132p. 1230662
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Report on Proj. TRIDENT.

Descriptors: (*Underwater sound, Propagation), (*Hydrodynamics, Sea water), (*Partial differential equations, Numerical analysis), Viscosity, Thermal conductivity, Gravity, Diffraction, Reflection, Refraction, Perturbation theory, Acceleration, Velocity, Differential equations, Integral transforms, Integration, Integrals, Green's functions, Functions, Solids.

The main purpose of this report is to provide a survey of the accuracy and speed that can be expected from various computational methods. In general, acoustic wave equation, is dealt with. The computational survey is planned to consist of three parts, of which only the first is completed. This first part summarizes the mathematical properties of certain wave equation techniques, from the viewpoint of ultimate computational use. In particular, the fundamental relationships between characteristic surfaces and rays, bicharacteristics, wave fronts, surfaces of constant phase, the sequence of eikonal approximations, the various interpretations of Huygens' principle, the integral formulations of Poisson, Kirchhoff, and Helmholtz, and Hamilton-Jacobi theory are rather thoroughly considered, and are illustrated by a comparative discussion of certain problems in the reflection, refraction, and diffraction of acoustic waves. (Author)

AD-415 206 Div. 25
(TISTM/ODN) OTS price $2.60

Illinois U., Urbana.
NMR STUDIES OF PHASE TRANSITIONS. I. NaSH,
by C. K. Coogan and H. S. Gutowsky. 28 June 63, 29p. Technical rept. no. 66
Contract Nonr183413, Task NR051 215
Unclassified report

Descriptors: (*Phase studies, Nuclear magnetic resonance), (*Sodium compounds, Phase studies), (*Nuclear magnetic resonance, Phase studies), Crystals, Crystal lattices, Ions, Crystal structure, Sulfides, Hydrogen compounds, Isotopes.

The H-1 and Na-23 resonances in polycrystalling samples of NaSH at temperatures above and below the cubic phase transition were studied. A number of interesting phenomena can be observed, including diffusion of the Na(+) and SH(-) ions through the lattice, and a broad region of transition from the rhombohedral to the cubic phase probably due to an order-disorder type of transformation. In addition, the results make it highly probable that a modified rotational model is current, and that in the cubic phase, above about 80 C, the SH(-) ion reorients rapidly and randomly among the eight (111) directions. Somewhat surprisingly the Na-23 resonance is observed in the rhombohedral phase. One would not a priori expect this, as the Na-23 quadrupole interaction with the electric field gradient in non-cubic crystals is generally large, obliterating NMR signals in powders. This behavior is not observed in the Na-23 resonance in NaCN, a closely similar substance, at temperatures below the cubic transition. (Author)

AD-415 215 Div. 25
(TISTM/ODN) OTS price $1.10

Columbia Radiation Lab., New York.
THE COLLISION BROADENING OF DOUBLE RESONANCE LINE SHAPES.
by F. W. Byron, Jr. 1963, 1p.
Grant AF AFOSR 62 65
AFOSR Rept. no. 5012 Unclassified report

Descriptors: (*Optical phenomena, Resonance), Atomic energy levels, Cadmium.

AD-415 261 Div. 25
(TISTP/WH) OTS price $4.60

Little, Arthur D., Inc., Cambridge, Mass.
PHYSICAL CHEMISTRY IN THE OCEAN DEPTHS: THE EFFECT OF PRESSURE ON IONIC TRANSPORT PROCESSES AND EQUILIBRIA.
Technical rept.,
by R. A. Horne and G. R. Frysinger. Mar 63, 41p.
Rept. no. 1320363
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Report on Project TRIDENT.

Descriptors: (*Electrolytes, Solutions), (*Solutions, Electrical conductance), Physical chemistry, Potassium compounds, Hydroxides, Hydrogen compounds, Sulfuric acid, Sodium compounds, Chlorides, Magnesium compounds, Hydrostatic pressure, Ionic current.

The specific electrical conductances of the aqueous battery electrolytes KOH, H2SO4, and NaCl-MgCl2 were measured as a function of hydrostatic pressure up to pressures of 60,000 lb/sq in. The pressure dependencies of the activation energies of the ''normal'' and protonic conduction mechanisms in aqueous solution were determined. The results show that potassium and hydrogen ions conduct by different mechanisms, the latter by a Grotthuss-type mechanisms. Conductivity measurements have shown that the dissociation of the complex ion FeCl++ increases with increasing pressure whereas that of the ion-pair FeNO3++ shows no pressure dependence. (Author)

AD-415 283 Div. 25, 20
(TISTP/WH) OTS price $2.60

Kansas U., Lawrence.
Cr51 NUCLEAR ORIENTATION IN A CERIUM MAGNESIUM NITRATE CRYSTAL,
by H. F. Taylor, Jr. and R. C. Sapp. 1 Aug 63, 18p. Technical rept. no. 5
Contract Nonr277500, Task 018 202
Unclassified report

Descriptors: (*Cerium, Isotopes), Single crystals, Nitrates, Magnesium compounds, Cerium compounds, Polynomials.

Cr-51 nuclei were aligned in Cr(+++) ions introduced into a slightly cloudy, spherical single crystal of cerium magnesium nitrate and magnetically cooled to temperatures down to 1/325 deg K(-1). Angular distribution and linear polarization data are interpretable on the basis of paramagnetic resonance information, if in addition the presence of intermediate state reorientation is accounted for by coefficients Q sub k in the Legendre polynomial expansion of the radiation pattern W (theta) = 1+A sub 2 P sub 2 + A sub 4 P sub 4. We find Q sub 2 = 0.40±0.04, Q sub 4=43±12 at 1/T=325 if delta=±(E2/M1) to the 1/2 power = +0.44±0.05. These results are contrasted with those of an earlier experiment, and compared with a theoretical treatment of reorientation by static, isotropic hfs coupling which yields in the hard-core limit at this temperature Q sub 2 = 0.61. (Author)

AD-415 285 Div. 25, 27
(TISTM/TLG) OTS price $2.25

Marquardt Corp., Van Nuys, Calif.
RESEARCH ON EXPERIMENTAL EVALUATION OF SPUTTERING YIELD RATES.
Final technical rept.,
by K. B. Cheney, E. E. Rogers and E. T. Pitkin.
July 63, 90p.
Contract AF33 616 8120, Proj. 7116, Task 7116 03
ARL 63 125 Unclassified report

Report on Energy Conversion Research.

Descriptors: (*Ion engines, Materials), (*Ion bombardment, Physical properties), (*Secondary emission, Test methods), Ions, Xenon, Argon, Copper, Tungsten, Molybdenum, Titanium, Silicon, Particle accelerator targets, Electrodes, Erosion, Bibliographies.

Phenomena associated with the interaction of high energy ions and solid surfaces under conditions relevant to ion rocket operation were investigated. The number of target atoms removed per incident ion, or sputtering ratio, has been determined for xenon and argon ions incident on copper, tungsten, molybdenum, silicon and titanium with energies from 1,500 to 39,000 electron volts and at incidence angles from 2 degrees to normal incidence. The effect of target temperatures, both high and low, on the sputtering ratio has been investigated. The ratio of secondary particles produced to incident ions, along with their energy and angular distribution, has been investigated as functions of ion energy and incidence angle. Areas investigated include: (1) sputtering and secondary emission for very low angles of ion incidence, and effects of surface roughness; (2) the energy and angular distributions of secondary particles as a function of beam incidence angle; and (3) sputtering and secondary emission of surfaces at reduced temperatures. (Author)

AD-415 323 Div. 25, 8
(TISTP/WH) OTS price $4.60

Microwave Associates, Inc., Burlington, Mass.
INVESTIGATION OF HIGH POWER GASEOUS ELECTRONICS.
Quarterly progress rept. no. 2, 16 Feb-15 May 63,
by H. S. Maddix, J. Gregory, and C. S. Ward.
24 June 60, 28p. Rept. no. 2
Contract DA36 039AMC00097, DA Task 1G6 22001A055 04
U(NCLASSIFIED REPORT

Descriptors: (*Electric discharge, Microwaves), (*Electron tubes, Gases), Absorption, Argon, Krypton, Helium, Quartz, Neon.

Cleanup and thermal recovery of inert gases at the interface between a high power microwave discharge and a quartz surface have been further investigated. Argon, krypton and helium appear to have comparable cleanup characteristics. Neon reveals the fastest cleanup rate and xenon does not appear to cleanup in the long term. In all cases the number of atoms sorbed while the discharge was on was observed to be proportional to the square root of time. Rapid and complete recovery of the trapped gas is observed following cleanup at low ambient temperatures. Recovery following cleanup at high ambient temperatures is characterized by a much slower desorption which is linear with the equare root of time. Analysis of the data indicates that cleanup and recovery are controlled by activated diffusion. (Author)

AD-415 324 Div. 25, 8
(TISTP/WH) OTS price $13.00

RCA Victor Co. Ltd. (Canada).
MICROWAVE MEASUREMENTS OF FINITE PLASMAS,
by M. P. Bachynski, G. G. Cloutier and K. A. Graf. May 63, 182p. Research rept. 7 801 26
Contract AF19 604 7334
AFCRL 63 161 Unclassified report

Scientific report no. 2.

Descriptors: (*Plasma physics, Microwaves), (*Microwaves, Plasma physics), Diffraction, Measurement, Electron density, Attenuation, Propagation.

Investigations are described which were designed to test the validity of various theoretical treatments of plasma properties and to assess the accuracy of various microwave systems for determining the properties of plasmas which are finite in extent using free-space microwave techniques. Theoretical results are obtained for prediction of plasma effects. Measurements on various experimental geometries demonstrate the influence of the dielectric boundaries of the plasma container, the effect of multiple reflections within the measurement system, and the precautions which must be exercised both in the measurement and interpretation of the results. Measurements of plasma properties using a number of different microwave arrangements are assessed and the limitations of the various systems shown. Finally, free-space microwave determination of the properties of a plasma generated in Helium and in Argon are presented. (Author)

AD-415 325 Div. 25, 2
(TISTP/FR) OTS price $1.60

Observatoire de Paris-Meudon (France).
POLARIMETRIC OBSERVATIONS OF PLANETS AND SATELLITES.
Annual summary rept. no. 2, 1 June 62-31 May 63,
by Audouin Dollfus. 30 June 63, 9p.
Contract AF61 052 508
AFCRL 63 864 Unclassified report

Descriptors: (*Light, Polarization), Infrared radiation, Planets, Measurement, Polariscopes, Telescopes, Mirrors, Reflection.

The purpose of the program is to investigate the physical properties of the surfaces of the planets, the Moon, the satellites, and asteroids of the Solar System, by means of polarimetric studies, using new photoelectric polarimeters which have become available since the recent development of photomultiplier techniques. Observations require the use of a large telescope, and

we have improved especially for this purpose the old 40-in reflector of Meudon Observatory, out of use for a quarter of a century. Observations also require electric polarimeters of very high sensitivity for different wavelength ranges, and we designed three different instruments covering, respectively, the visible spectrum, the near infra-red, and the infra-red. Phototubes carefully selected for the highest sensitivity obtainable are employed, and are exploited with the most refined thechniques to take full advantage of the sensitivity. (Author)

AD-415 330 Div. 25, 17, 26
(TISTM/AMS) OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
MIXED CRYSTALS InAsySb1-y PREPARED BY THERMAL EVAPORATION,
by R. F. Potter and G. G. Kretschmar. 1 Aug 63, 11p.
NAVWEPS rept. 8162 Unclassified report

Descriptors: (*Semiconducting films, Manufacturing methods), (*Indium alloys, Antimony alloys), (*Intermetallic compounds, Semiconductor films), X-ray diffraction analysis, Optical properties, Films, Glass, Refractive index, Crystals, Semiconductors, Evaporation, Electrons, Density, Transport properties, Copper, Impurities, Arsenic alloys.

The system InAs-InSb has been produced by the thermal evaporation of the metallic constituents. The technique used was an extension of one developed for InSb. The films produced were n-type in character, with carrier concentration in excess of 10 to the 18th power 1cc. Because of the small effective masses of these compounds, dispersion effects were apparent for the refractive indices. Transmission measurements to 6 microns are shown. (Author)

AD-415 361 Div. 25
(TISTP/MFA) OTS price $5.60

Electro-Optical Systems, Inc., Pasadena, Calif.
OPTICALLY PUMPED IMAGE LIGHT AMPLIFICATION.
Quarterly rept. no. 1, 10 May-10 Aug 63,
by H. Bernstein, P. Fletcher, B. Kazan, L. Nugent, and D. Weisman. Aug 63, 53p. Rept. no. 339001
Contract AF33 657 11326, Proj. 4156 05
Unclassified report

Descriptors: (*Lasers, Design), (*Image intensifiers (Electronics), Emissivity), Fluorescence, Photons, Single crystals, Noise, Light transmission, Absorption, Optics, Gases, Helium, Neon, Semiconductors, Gallium compounds, Arsenides, Calcium compounds, Fluorides, Ruby, Yttrium, Guropium, Oxides, Metal-organic compounds, Liquids.

Primary attention has been given to the problem of the generation of background light caused by spontaneous emission and its amplification in passing through an intensifier. Because of the high fluorescence level occurring, schemes for possible lowering this background were considered. One of these involves the incorporation of a non-uniform pumping intensity or the incorporation of a non-uniform density of luminescent states along the amplifier axis. Another possibility considered is the use of an auxiliary abosrbing medium placed between the intensifier output and the observer's eye, which would be optically non-linear in such a way that its light transmission is low below a specified light level, but high above this threshold. The factors concerned with the choice of a material for the amplifier itself were separately considered, and the problem of obtaining uniform pumping in the case of an optically-pumped amplifier was also considered. (Author)

AD-415 362 Div. 25, 13
(TISTM/EJH) OTS price $9.60

Illinois U., Urbana.
INTERACTION OF PLANE ELASTIC WAVES WITH A CYLINDRICAL CAVITY,
by Stanley L. Paul and Arthur R. Robinson.
June 63, 121p.
Contract AF29 601 5007, Proj. 1080, Task 108001
RTD TDR63 3021 Unclassified report

Descriptors: (*Stresses, Mathematical analysis), (*Shock waves, Stresses), Underground structures, Shelters, Nuclear explosions, Cylindrical bodies, Integral equations.

A method is presented for computing stresses in the vicinity of a long cylindrical cavity in an infinite, elastic, isotropic, homogeneous medium when the cavity is enveloped by a plane stress wave traveling in a direction perpendicular to its axis. Hoop stresses around the cavity boundary were computed for the passage of a wave of dilation and a wave of pure shear; the stresses in the medium away from the boundary were computed for a wave of dilation. Initially the stress behind the incident wave front was considered to be constant. The effect of a stress decay behind the front was then computed by using the Duhamel integral for the case of an incident wave of dilation. The method of solution of the problem involves superposition of the stress field of an incoming plane step wave and a stress field corresponding to waves which diverge from a line source. (Author)

AD-415 370 Div. 25, 7
(TISTP/WH) OTS price $9.10

Pratt and Whitney Aircraft, East Hartford, Conn.
INVESTIGATION OF MAGNETOHYDRODYNAMIC POWER GENERATION VOLUME V - THEORETICAL PLASMA CONDUCTIVITY STUDIES.
Final rept., 19 Apr 61-31 Dec 62.
Jan 63, 1v. Rept. no. PWA2133
Contract AF30 602 2487, Proj. 5561, Task 556101
RADC TDR62 464, Vol. 5
Unclassified report

Descriptors: (*Magnetohydrodynamics, Generators), (*Generators, Magnetohydrodynamics), Electrical conductance, Boundary layer, Electrodes, Diffusion, Electrons, Ions.

The formulas for the electrical conductivity and diffusion coefficients of a magnetohydrodynamic generator plasma including ion flow are derived. The electron energy equation is developed leading to an expression for electron temperature. These formulas are applied to calculating these quantities in segmented and unsegmented MHD generators. It is shown that in segmented generators these quantities have much more favorable values. The approximate relations based on constant electron collision frequency can lead to inaccurate results, especially in the Hall mobility ratio. The MHD electrode boundary layer is investigated to find the electrode voltage drop. The electron and ion continuity and current and energyequations across the boundary layer are formulated. Due to time limitations, simplified forms of these equations are solved simultaneously with the integral form of the gas continuity, momentum and energy relationships. This leads to profiles of the electric

field, electron density, and electron temperature. The electric field is integrated across the boundary layer to find the voltage drop per unit boundary layer thickness. The cathode voltage drop is dependent on the gas temperature profile near the wall. Devices such as roughening or wedges that lead to higher initial temperature gradients should appreciably lower the voltage drop. (Author)

AD-415 424 Div. 25, 20
(TISTP/MFA) OTS price $5.60

San Andres U., La Paz (Bolivia)
STUDY OF EXTENSIVE AIR SHOWERS AT 5200 m ALTITUDE WITH SPECIAL RESPECT TO GAMMA RAY SHOWERS.
Final technical rept.
Oct 62, 1v.
Contract AF49 638 922
Unclassified report

Descriptors: (*Gamma rays, Atmosphere), Compton scattering, Cerenkov radiation, Detectors, Electron density, Cloud chambers, Muons, Neutron spectrum, Particles, Shielding, Construction, Materials.

AD-415 427 Div. 25, 2
(TISTP/JP) OTS price $3.60

Chalmers U. of Tech. (Sweden).
DYNAMIC NON-LINEAR WAVE PROPAGATION IN IONIZED MEDIA. 9. A NON-LINEAR COUPLING MECHANISM FOR GENERATION OF VERY LOW FREQUENCY WAVES,
by K. H. B. Wilhelmsson. 1963, 21p. Rept. no. 34
Contract AF61 052 451
AFCRL 63 658 Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Very low frequency, Electromagnetic waves), (*Wave transmission, Nonlinear systems), Whistlers, Atmospherics, Polarization, Space charges, Cosmic rays, Plasma medium, Exosphere, Solar corona, Electron beams, Electron density, Electrons, Ions, Magnetic fields, Oscillations, Magnetohydrodynamics, Partial differential equations, Frequency.

The generation of mixed-frequency fields by interaction of a longitudinal space-charge wave, carried by an electron stream through a plasma, and an electromagnetic wave - or a gyro-wave is studied. The direction of propagation of the interacting waves, of different frequencies, is assumed to coincide with that of a static magnetic field. It is demonstrated that the generated difference-frequency field may propagate as an electron gyro-wave or possibly as an ion gyro-wave or even hydromagnetic wave, if the difference-frequency is sufficiently small and the effect of collisions negligible. The investigation is limited to the case of an infinitely extended homogeneous medium. (Author)

AD-415 433 Div. 25
(TISTM/TLG) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
SOLUTE REDISTRIBUTION DURING SOLIDIFICATION OF EUTECTIC-FORMING MIXTURES,
by W. R. Wilcox. 22 July 63, 19p. Rept. no. TDR169 3240 10TN2
Contract AF04 695 169
SSD TDR63 160 Unclassified report

Descriptors: (*Eutectics, Freezing), (*Freezing, Theory), Mixtures, Phase studies, Integral transforms, Zone melting.

The problem of the progressive freezing of a simple eutectic-forming binary mixture from an infinite melt with pure diffusional mass transfer is solved by the method of Laplace transforms. (Author)

AD-415 440 Div. 25
(TISTP/TL) OTS price $4.60

Chalmers U. of Tech. (Sweden)
DYNAMIC NON-LINEAR WAVE PROPAGATION IN IONIZED MEDIA; NON-LINEAR ELECTROMAGNETIC WAVE PROPAGATION AND HARMONIC RADIATION IN MAGNETO-IONIC MEDIA,
by O. E. H. Rydbeck. 1 Mar 63, 36p. Rept. no. 29
Contract AF61 052 451
AFCRL 63 695 Unclassified report

Descriptors: (*Electromagnetic waves, Propagation), (*Magnetic fields, Ionization), Resonance, Cyclotron waves, Harmonic analysis, Refractive index, Nonlinear systems, Polarization, Ionospheric propagation, Whistlers.

Non-linear propagation studies are extended to a magneto-ionic medium; the limitation being, that all wave normals have been assumed to be parallel. The general theory, involving arbitrary wave normals, will be dealt with in a forthcoming eport. It is shown that, as expected, travelling wave resonances occur in the magneto-ionic medium, not only between waves of the same kind (e.g. between waves of ordinary polarization) but equally frequently between waves of opposite kinds. From the non-linear interaction point of view there, thus, is not much difference, at least in principle, between the ordinary and extraordinary waves. One also finds, which is of interest in this connection, that the second order non-linear waves are characterized by two different kinds of polarization which become equal only at travelling wave resonance. (Author)

AD-415 441 Div. 25
(TISTP/JP) OTS price $6.60

Air Force Cambridge Research Labs., Bedford, Mass.
ON DETERMINATION OF THE OPTICAL ABSORPTION COEFFICIENT,
by Alfred Kahan and Herbert G. Lipson. June 63, 63p. AFCRL63 325
Proj. 5621
Unclassified report

Descriptors: (*Functions, Tables), (*Absorption spectrum, Mathematical models), (*Optical properties), Light transmission, Reflection, Absorption, Thickness, Light, Wave transmission, Semiconductors.

The equation for the optical absorption coefficient alpha in terms of the transmission and reflection coefficients T and R is derived. In addition, a computer program is described for the calculation of the absorption coefficient and optical constants either from the combination of reflection and transmission coefficients or from transmission experiments on two samples of different thicknesses. A set of tables of alpha d where d is the sample thickness, as a function of T in intervals of 0.2% for parameters of R in 0.5% is included. Both R and T values range between 0 percent and 100 percent. (Author)

AD-415 442 Div. 25, 15
(TISTP/HG) OTS price $5.60

General Dynamics/Electronics, Rochester, N. Y.
APPROXIMATE EQUATIONS GOVERNING FINITE-AMPLITUDE SOUND IN THERMOVISCOUS FLUIDS.
Technical rept.,
by David T. Blackstock. May 63, 47p. GD/E rept. GD1463 52
Contract AF49 638 1118
Unclassified report

Report on High Intensity Sound.

Descriptors: (*Partial differential equations, Sound), (*Sound transmission, Fluids), Numerical analysis, Thermal conductivity, Boundary layer, Viscosity, Fluid flow, Entropy, Specific heat, Equations of state, Boundary value problems, Sound signals, Acoustics, Particles, Thermal expansion, Gases, Taylor's series, Temperature, Velocity, Propagation, Perturbation theory, Attenuation, Fluid mechanics, Thermodynamics.

The equations of motion for viscous, thermally conducting, inert fluids of arbitrary equation of state are approximated so as to account as simple as possible for effects of nonlinearity and dissipation. The purpose is to obtain a general improvement of the classical wave equation. The approximation method is basically the same as the one used by Lighthill (1956) to derive Burgers' equation for unbounded, progressive, plane waves in a perfect gas. Besider encompassing the case treated by Lighthill, the equations are applicable for nonplanar waves, for interacting waves, and for waves subject to boundary-layer effects. Moreover, the fluid need not be a perfect gas. Important simplifications arise when either boundary-layer or main-stream dissipation is negligible. When only mainstream losses are important, the assumption of plane progressive waves leads to Burgers' equation. Two forms of Burgers' equation are given. One is suitable for initial-value problems and the other is suitable for boundary-value problems. (Author)

AD-415 452 Div. 25
(TISTM/AMS) OTS price $3.60

NRA. Inc., Long Island, N. Y.
CONTROLLED RELEASE OF ELECTROMAGNETIC RADIATION BY STIMULATED EMISSION IN LIQUID HYDROGEN.
Final rept.,
by Richard Akerib, Andrew I. Blum, David Carter, and Melvin P. Ehrlich. 27 May 63, 31p. Rept. 825 1
Contract AF30 602 2669, Proj. 5561, Task 556101
RADC TDR63 259 Unclassified report

Descriptors: (*Liquefied gases, Hydrogen), (*Hydrogen, Liquefied gases), (*Electromagnetic waves, Liquefied gases), (*Lasers, Liquids), Excitation, Electric fields, Spins, Nuclear spins, Probability, Cryogenics, Test equipment, Distillation, Infrared radiation, Optical equipment, Thermal conductivity, Experimental data, Theory, Electrons, Mathematical analysis.

The transition from the triplet to the singley state in liquid hydrogen under stimulation by an 85 microns radiation and an electric field has been studied theoretically and experimentally. The theoretical study indicates that the ratio of the induced transition probability to the spontaneous transition probability is proportional to the square of the applied electric field. The experimental results indicate that the transition can be stimulated at any orthohydrogen concentration. The results point to a conclusion that at high concentrations, (65%), the transition rate is much higher than at lower concentrations, (40%). In fact, at concentrations of 65%, the concentration drops to 63% in 8.75 minutes, whereas at 40.2%, the concentration drops to 38.3% in 125 minutes. It seems, therefore, that at the higher concentration the energy becomes available more rapidly. (Author)

AD-415 463 Div. 25
(TISTP/JP) OTS price $4.60

Stevens Inst. of Tech., Hoboken, N. J.
ROTATIONAL EXCITATIONS AND TURBULENCE IN LIQUID HELIUM.
Final rept. for 1962,
by Laurence Mead. 1962, 39p.
Grant AFOSR62 125
AFOSR 4877 Unclassified report

Descriptors: (*Superconductivity, Helium), (*Helium, Superconductivity), (*Liquefied gases, Excitation), Rotation, Turbulence, Quantum mechanics, Operators (Mathematics), Annihilation reactions, Perturbation theory, Excitation, Vortices, Density, Cryogenics.

The density of states function has been calculated from specific heat measurements around the superfluid transition temperature of liquid helium He4. It exhibits poles and branch points at integer multiples of K times the transition temperature. The superfluid transition exhibits some features in common with the Bardeen-Cooper-Schrieffer and Kac-Uhlenbeck phase transition theories. (Author)

26. PRODUCTION AND MANAGEMENT

AD-414 392 Div. 26, 1
(TISTA/GEC) OTS price $33.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ORGANIZATION AND PLANNING OF AN AIRCRAFT CONSTRUCTION ENTERPRISE (Organizatsiya i Planirovaniye Samoletostroitel'nogo Predpriyatiya), by V. I. Tikhomirov. 1963, 827p.
FTD Rept. no. F TS 9503 V
Unclassified report

Trans. from State Publishing House for the Defense Industry, pp. 1-611, 1957.

Descriptors: (*Aircraft industry, Handbooks), Labor, Manufacturing methods, Management engineering, Personnel management, Industrial plants, Industrial production, Industrial relations.

This book discusses the principal questions of organization and planning of an aircraft construction enterprise: the forms and methods of the organization of production, the productive and organizational structure of the enterprise, the administration of the enterprise, the organization, standardization and payment of labor, the technical preparation and servicing of production, and the internal planning in the plant. A number of standards are included, so that it may be used as a handbook in practical work. (Author)

AD-414 561 Div. 26
(TISTE/CAM) OTS price $2.60

Naval Propellant Plant, Indian Head, Md.
DESIGN OF 12-INCH EXTRUSION PRESS,
by H. C. Foust. 27 June 63, 21p.
NavWeps Rept. 8451; TR133
Unclassified report

Descriptors: (*Presses (Machinery), Extrusion), Solid rocket propellants, Processing, Design, Mechanical drawings, Specifications.

Based on design studies for a high-energy propellant extrusion press engineering drawings and specifications are presented. This design incorporates positive ram head-to-basket alignment and safety features which will minimize, if not eliminate, the possibility of an explosion and subsequent major damage. (Author)

AD-414 639 Div. 26, 15
(TISTP/FEM) OTS price $2.30

Minnesota U., Minneapolis.
SURVEILLANCE PROBLEMS: A BREAKDOWN MODEL, by Jagdish K. Patel. Aug 63, 20p. Technical rept. no. 28
Contract Nonr710 31, Proj. NR042 003
Unclassified report

Descriptors: (*Stochastic processes, Mathematical models), (*Manufacturing methods, Production), (*Quality control, Statistical analysis), Machines, Maintenance, Reliability, Machine shop practice, Statistical distributions, Real variables, Sampling.

An economic model for the surveillance of a production process is proposed and studied. The state of the production process is described by a Poisson stochastic process, denoted by $x(t)$, with $x=0$ corresponding to the best state. The production process is such that at any instant of time it may go to the next state or may break down. Breakdown can be thought of as a state with a very large negative income. When $x(t) = x$, the income per unit of time is $i(x)$. $i(x)$ is assumed to be a nonincreasing function of x ($x \geq 0$). Repair is the essentinl part of the model which is decided by observing the production process continuously. It is assumed that the observation can be made without cost and that the result is known immediately. The cost of repair depends on how the process comes to stop. The time between the commencement of operations following repairs and the recurrence of that event is defined as a cycle. (Author)

AD-414 710 Div. 26, 17
(TISTM/AMS) OTS price $6.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTRODES AND FLUXES FOR ARC WELDING, by N. B. Fishbeyn. 23 May 63, 65p.
FTD TT62 1522 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashinostroitel'noy Literatury, no. 9, pp. 1-62, 1961.

Descriptors: (*Welding rods, Arc welding), (*Welding fluxes, Arc welding), (*Arc welding, Materials), Coatings, Manufacturing methods, Ceramic materials, Welding, Metals, Steel, Stainless steel, Iron, Castings, Alloys, Copper, Copper alloys, Aluminum, Aluminum alloys.

AD-414 725 Div. 26, 15
(TISTP/JP) OTS price $6.60

Bureau of Supplies and Accounts, Navy Dept., Washington, D. C.
THE NATURE OF RANDOM DEMAND.
July 61, 1v.
Contract Nonr290400
Unclassified report

Descriptors: (*Armed forces supplies, Scheduling), (*Logistics, Mathematical models), (*Naval procurement, Costs), (*Scheduling, Mathematical models), Statistical distributions, Integral transforms, Probability, Operations research.

The probability distributions that are pertinent to the description of Navy replacement demand processes are examined. Demand patterns observed in the Navy Supply System indicates that the actual demand process is complicated. Simple Poisson models for demand appear to be useful only in special situations, such as for certain classes of items that have very low demand rates. The remaining situations indicate that there is more ''clumping'' of demand or regularity of time between demands than is predicted by the Poisson model. Such distributions as the negative binomial, stuttering Poisson, geometric Poisson and the Erlang appear frequently in the literature of logistics systems, and are discussed. A systematic analysis of demand distributions is presented. (Author)

Division 26 - PRODUCTION AND MANAGEMENT

AD-414 774 Div. 26
(TISTM/AM) OTS price $6.60

System Development Corp., Santa Monica, Calif.
BUSINESS MANAGEMENT GAME, PART III: INSTRUCTIONS FOR THE USE AND MODIFICATION OF PROGRAM UMPIRE,
by Sandra Peterson. 20 May 63, 64p. Rept. no. TM1088 002 00

Unclassified report

Descriptors: (*Management engineering, Programming (Computers)), Programming languages, Personnel management, Game theory, Manufacturing methods.

This document describes the use, modification and maintenance of program UMPIRE, a program written in JOVIAL for the Philco 2000, to be used in the play of the management game described in TM-1088. The program can be used to replace some of the manual operations involved in umpiring for this game, which is based on the Andlinger-Green game described in the Harvard Business Review for March and April, 1958 by G. R. Andlinger. While the document describes in some detail those umpiring functions which are unique to the use of the program, it relies heavily on TM-1088 and TM-1088/001/00 for precise descriptions of those functions which are common to players and umpires or to umpires with and without the program. Since the program does not deal with the financial statements, those aspects of umpiring which are concerned with them are not covered. (Author)

AD-414 775 Div. 26
(TISTM/AM) OTS price $8.60

System Development Corp., Santa Monica, Calif.
BUSINESS MANAGEMENT GAME, PART II INSTRUCTIONS FOR UMPIRES,
by Sandra Peterson and A. C. Martin. 15 May 63, 95p. Rept. no. TM1088 001 00

Unclassified report

Descriptors: (*Management engineering, Programming (Computers)), Costs, Personnel management, Game theory.

This document describes in detail the operations to be performed by the umpires in the play of the management game described in TM-1088/000/00. Although the umpiring instructions have been somewhat modified, the game is based on the Andlinger-Green game as described by G. R. Andlinger in the Harvard Business Review for March and April, 1958. (Author)

AD-415 041 Div. 26, 10, 20, 4
(TISTM/ODN) OTS price $11.00

Aerojet-General Nucleonics, San Ramon, Calif.
HYDRAZINE PROCESS DEVELOPMENT.
Interim technical engineering rept., May-July 63, by J. C. Whipple, L. G. Carpenter, R. I. Miller, R. L. Pearson and F. R. Standerfer. July 63, 140p. Rept. no. AN1013
Contract AF33 600 42996
ASD TR7 849A(X) Unclassified report

Descriptors: (*Chemical industry, Processing), (*Hydrazine, Production), (*Liquid rocket propellants, Hydrazine), Organic nitrogen compounds, Fission product activity, Tracer studies, Ammonia, Chemical analysis, Decontamination, Decomposition, Manufacturing methods, Radiation chemistry, Nuclear engineering, Sampling, Instrumentation, Nuclear reactors, Operations research, Management engineering, Scheduling, Distillation, Gases, Industrial production, Industrial plants, Industrial equipment, Test equipment, Pumps, Fluid flow, Fuel injectors, Experimental data, Iodine.

This is the ninth Interim Technical Engineering Report on the Hydrazine Process Development Program, which is the second phase of a four-phase program leading to the production of hydrazine by fissiochemistry. The primary goal of the current program is to develop, design, construct, and operate a continuous in-reactor loop, with the associated fuel handling and product purification sections. Direct support work necessary for the development of the loop and its components included studies in decontamination, purification, fuel cycle, materials, chemical analysis, energy deposition, and reactor physics. Secondary support to the program includes capsule yield studies, basic studies of ion and free radical yield, and new product investigation. The results of these tasks will be coordinated to provide preliminary design and cost estimates for a self-critical pilot plant and prototype production plant. Progress in each of the six major areas of the Hydrazine Program is discussed fully in this report. (Author)

AD-415 122 Div. 26, 25
(TISTM/AMS) OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ENERGY PROPERTIES OF THE ELECTRIC WELDING ARC (Energeticheskiye Svoystva Elektricheskoy Svarocynoy Dugi),
by G. M. Tikhodeyev. 6 Aug 63, 302p.
FTD TT62 1818 Unclassified report

Trans. from Izdatel'stvo Akademii Nauk SSSR Moskva. pp. 1-254, 1961. Leningrad.

Descriptors: (*Electric arcs, Welding), (*Welding, Electric arcs), Magnetic fields, Arc welding, Theory, Economics, Equations, Energy, Thermal conductivity, Electrical conductance, Temperature, Distribution, Scientific research, Control.

This monograph contains the results of the broad experimental research - work of the author in the field of the electric arc as applied in welding techniques. Numerous statistical properties of arc discharges are cited, in a number up to 2,000, and a theory of approximation is set up allowing for the computation of these properties. The influence of magnetic fields on the arc discharge is analyzed. Ways are increasing the economy of the welding arc. The author's conclusions are of interest not only for welding, but also for other applications of the arc - in lighting techniques, electrothermics, for the design of electrical apparatus. The book is designed for engineers, scientific workers, post-graduates and students interested in the technical application of the arc discharge. (Author)

AD-415 212 Div. 26, 17, 22
(TISTM/BRW) OTS price $11.50

Cadillac Motor Car Co., Cleveland, Ohio.
REPORT ON WELD FEASIBILITY STUDIES WELDED HEAT

TREATABLE ALUMINUM ALLOYS FOR THE GENERAL SHERIDAN TEST RIG (PROGECT HAAS).
Final rept.,
by J. Hassler. 1 Aug 63, 69p. Production Engineering rept. no. 140
Contract DA33 0190RD3349
Unclassified report

Descriptors: (*Welding, Feasibility studies), (*Aluminum alloys, Armor plate), (*Armor plate, Welding), Thermal joining, Welds, Metal joints, Configuration, Heat treatment, Hardness, Mechanical properties.

AD-415 399 Div. 26, 14
(TISTM/REB) OTS price $3.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
CERAMIC SYSTEMS FOR MISSILE STRUCTURAL APPLICATIONS.
Quarterly rept. no. 3, 1 May-31 July 63.
31 July 63, 35p.
Contract NOw63 0143d
Unclassified report

Descriptors: (*Ceramic materials, Flame spraying), (*Composite materials, Manufacturing methods), (*Manufacturing methods, Fibers), (*Flame spraying, Ceramic materials), Radomes, Silicon compounds, Dioxides, Wood, Aluminum compounds, Oxides, Torches, Oxygen, Casting, Additives, Clay, Hypersonic flight, Structural shells.

Techniques for flame glazing (surface melting) slip-cast fused silica were successfully developed using an oxyacetylene flame. A high degree of parameter flexibility was obtained with this flame. Requirements for producing strong dense ceramic-wood fiber felts using modified paper making techniques were determined on 1: 2: 2 wood fiber, alumina clay compositions. Highly dispersed and/or fibrillose fibers, a solid contents no greater than 2 wt.-% and a flocculating system were found necessary. Indications were that type of clay used affected drain time but had little effect on green density of felts. Strong alumina-clay compacts of 50 to 60 lb/cu ft fired density were obtained. Linear shrinkage was 11 to 12% however, this should decrease with decreasing clay content. (Author)

27. PROPULSION SYSTEMS

AD-414 412 Div. 27
(TISTA/FRL) OTS price $9.10

Fluidyne Engineering Corp., Minneapolis, Minn.
RESULTS OF RAMJET FACILITY MODEL TESTS AT MACH 7,
by James L. Grunnet. Aug 63, 93p.
Contract AF40 600 946, Task 695101
AEDC TDR63 173
Unclassified report

Descriptors: (*Ramjet engines, Hypersonic wind tunnels), Exhaust diffusers, Test facilities, Ramjet inlets, Temperature, Friction, Pressure, Performance (Engineering), Boundary layer, Configuration, Schlieren photography, Reynolds number.

A test program was conducted to provide ramjet test facility bypass flow second throat diffuser pressure recovery data at a nominal nozzle exit Mach number of 7.0. During the tests a study was made of the effects of stagnation temperature, Reynolds number, ramjet inlet to facility nozzle exit area ratio, and other geometric variables. Two facility models were tested, the earlier Phase I model having a cowl lip angle of 35 degrees with a flare angle of 30 degrees, and the Phase II model having a lip and flare angle of 15 degrees. Prior to the tests it was hoped that it would be possible to attain bypass diffuser pressure recoveries approaching the pressure recovery across a normal shock at the nozzle exit Mach number. The best performance, which was obtained with the Phase II model, gave a pressure recovery corresponding to 65% of normal shock recovery. A significant influence of cowl flare angle was noted since the maximum recovery obtained with the Phase I model was 37% of normal shock recovery. (Author)

AD-414 445 Div. 27, 12
(TISTP/AW) OTS price $4.60

Rocketdyne, Canoga Park, Calif.
RETENTION OF RADIATION BOOTS FOR THE ATLAS MA-5 PROPULSION SYSTEM.
15 Aug 63, 37p. Rept. no. R5297
Contract AF04 695 306
Unclassified report

Descriptors: (*Booster motors, Guided missiles (Surface to surface)), Sustainer motors, Launch vehicles (Aerospace), Rocket motors (Liquid propellant), Exhaust flames, Flame deflectors, Rings.

The program consisted of designing, fabricating, and verifying hardware required to improve the radiation boot retention on the MA-5 booster, the standard D-series sustainer and the standard launch vehicle (SLV-3) sustainer. The booster program consisted of verifying the adaptability and suitability of utilizing the segmented channels used on the MA-3 booster engines as proposed by engineering change proposal (ECP) MA3-345. The standard D-series sustainer program consisted of designing, fabricating, and verifying hardware to (1) increase the height and quantity of radiation boot retention clips and (2) lower the profile of the four drain lines to minimize the gap between the boot and the aspirator. The SLV-3 program consisted of studies to minimize the gap between the radiation boot and the aspirator caused by the addition of the one-inch lube drain line added to the SLV-3 sustainer by ECP MA5-65. The pulse criteria has been established at 2.5 psi. (Author)

AD-414 550 Div. 27
(TISTA/FRL) OTS price $5.60

Office of Research Administration, U. of Michigan, Ann Arbor.
THE FEASIBILITY OF A ROTATING DETONATION WAVE ROCKET MOTOR.
Quarterly progress rept. no. 1, 1 June-31 Aug 62,
by J. A. Nicholls, R. E. Cullen, G. L. Cosens, M. Sichel and E. Kurath. Aug 62, 45p. 05179 1P
Contract AF04 611 8503, Proj. 05179
Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Rocket research), Feasibility studies, Detonations, Shock wave, Theory, Experimental data, Combustion, Deflagration, Heat transfer, Test equipment, Rotation.

Division 28 - PSYCHOLOGY AND HUMAN ENGINEERING

AD-414 551 Div. 27
(TISTA/FRL) OTS price $8.10

Office of Research Administration, U. of Michigan, Ann Arbor.
THE FEASIBILITY OF A ROTATING DETONATION WAVE ROCKET MOTOR.
Quarterly progress rept. no. 2, 1 Sep-30 Nov 62, by J. A. Nicholls, R. E. Cullen, T. C. Adamson, G. L. Cosens and M. Sichel. Dec 62, 58p.
05179 2P
Contract AF04 611 8503, ORA Proj. 05179
Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Feasibility studies), Detonations, Shock waves, Hydrogen, Oxygen, Scattering, Velocity, Rotation, Heat transfer, Energy, Thrust, Temperature, Pressure, Liquid rocket propellants, Drops, Theory.

The rotating detonation wave engine feasibility program is reported. The theoretical studies included the study of the structure of a detonation wave through a two-phase medium has continued emphasizing the droplet shattering mechanism. Utilizing a theoretical relation for a shear-type breakup developed by Dodd, it is concluded that the distance predicted for droplet breakup behind the strong normal shock wave associated with an H2-O2 detonation can be much smaller than experimentally observed distances between the shock and the zone of significant chemical reaction. It is concluded therefore that the droplet shattering effect occurring behind the shock wave can be of extreme importance in substaining a Chapman-Jouguet detonation in dilute sprays. Also reported is the study of the heat transfer to the wall of a rotating detonation wave engine. And the study of an analytical model for the gas dynamics associated with the rotating detonation wave engine. (Author)

AD-414 585 Div. 27
(TISTM/EJH) OTS price $3.60

Aerojet-General Corp., Sacramento, Calif.
WEAPON SYSTEM 107A-2. PRODUCT ENGINEERING PROGRAM.
Monthly progress rept. no. 2, 1-31 July 63, 31 July 63, 1v. Rept. no. 212/SA3 2.2M2
Contract AF04 694 212
Unclassified report

Descriptors: (*Thermal insulation, Rocket motors (Liquid rocket propellant)), (*Combustion chamber liners, Rocket motors (Liquid rocket propellant)), (*Rocket motor nozzles, Rocket motors (Liquid rocket propellant)), (*Rocket motors (Liquid rocket propellant), Thermal insulation), (*Cooling, Rocket motors (Liquid rocket propellant)), Metal coatings, Zirconium compounds, Oxides, Combustion, Stability, Combustion chambers, Fuel injectors, Ablation, Regenerative cooling (Rockets).

Contents: Coated metajlic thrust chambers; Expandable nozzles; Combustion instability scaling concepts; and Ablative thrust chambers.

AD-415 227 Div. 27, 33, 18, 22
(TISTA/VGW) OTS price $2.60

Frankford Arsenal, Philadelphia, Pa.
PROPELLANT ACTUATED DEVICE (PAD) ASSISTED PARACHUTE SYSTEM FOR AERIAL DELIVERY OF CARGO.
Technical summary rept.,
by C. J. Litz, Jr. March 63, 117p.
DA Proj. 502 06 001
FA rept. R1671
Unclassified report

Original contains color plates: All DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Airdrop operations, Retro rockets), (*Cargo, Air transportation), Parachute descents, Solft landings, Feasibility studies, Impact, Shock.

The feasibility of using existing propellant actuated device (PAD) type rockets and other appurtenances, such as ground sensor and safe arming systems was investigated to reduce the ground contact velocity of air-delivered cargo. Specifically considered were cargo loads in the range of 2000 to 35,000 lb which were decelerated by parachute to a velocity of 40 to 60 fps; then, by the use of PAD type retrorockets, the velocity was to be further reduced to 25 fps just prior to ground contact. Results of the study indicated that an aerial recoevery system consisting of parachutes and PAD type retrorockets can provide a reduction of approximately 60 percent in weight and volume and, also, provide a saving in cost when compared to the all-parachute recovery system. (Author)

AD-415 435 Div. 27
(TISTE/JBM) OTS price $1.10

Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.
DESIGN, DEVELOPMENT, AND FABRICATION OF ULTRA-HIGH STRENGTH SOLID PROPELLANT ROCKET MOTOR CASES.
Quarterly progress rept. no. 1, 20 May-20 Aug 63, by Carmine J. Bua. 30 Aug 63, 3p.
Contract AF04 611 9064
Unclassified report

Descriptors: (*Rocket cases, Rocket motors (Solid propellant)), Mechanical properties, Forgery, Design, Processing.

Efforts concern the design, development, and fabrication of ultrahigh strength solid propellant rocket motor cases. The initial design work for the centerbody, skirts, forward and aft domes and the basic case was completed. The necessary tool design and procurement is underway and all tooling will be available prior to its need in the fabrication cycle. This includes the tooling before and after heat treat. All of the inspection check sheets are being prepared in accordance with the Program Planning and Status Chart and will be available prior to the completion of any machine operations. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-414 103 Div. 28
(TISTB/AAR) OTS price $1.60

Human Engineering Lab., Aberdeen Proving Ground, Md.
STUDIES ON THE PERCEPTUAL THRESHOLD FOR MOTION.

II: EFFECTS OF INDUCED MOTION ON THRESHOLD VELOCITY,
by Charles Fried. Oct 62, 13p.
HEL TM18 62 Unclassified report

Descriptors: (*Velocity, Thresholds (Physiology)), (*Motion, Velocity), Human engineering, Detection, Physiology, Psychology, Display systems.

A proposed method for reducing threshold for perceived motion, by adding the force of induced movement to true movement, was explored. Induced movement was evidenced by (1) subjects reporting movement when no actual movement occurred, and (2) the increase in threshold when the direction of its influence was opposed to actual movement. The predicted threshold reduction, when the direction of actual and induced movement were identical, did not occur, because, presumably, the subjects attempted to compensate for the influence of induced movement. (Author)

AD-414 229 Div. 28
(TISTB/WA) OTS price $1.10

Texas Christian U., Fort Worth.
DIMENSIONS OF STIMULUS SITUATION WHICH ACCOUNT FOR BEHAVIOR VARIANCE.
Quarterly status rept.
1 July 63, 4p.
Contract Nonr 3436 00
Unclassified report

Descriptors: (*Behavior, Environmental tests), Stimulation, Group dynamics, Decision making, Psychology.

AD-414 582 Div. 28
(TISTB/AAR) OTS price $3.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville,, Pa.
THE SUCCESSIVE DIFFERENTIATION OF A LEVER DISPLACEMENT RESPONSE,
by Robert M. Herrick. 24 July 63, 29p.
NADC AMAL MA6307 11 Unclassified report

Descriptors: (*Performance tests, Rats), Distribution, Displacement reactions, Selection, Laboratory equipment, Analysis, Psychology.

Maximum displacements of lever presses by rats were recorded under 8 successively-smaller 'reinforcement zones' (RZ). The largest RZ included displacements from 3.29 degrees to 44.01 degrees, the smallest, from 23.65 degrees to 28.74 degrees. Work expended was linearly proportional to displacement. As the RZ decreased, displacement distributions reflected a 'least effort' tendency: distributions peaked at the lower limit of RZ and most nonreinforced presses fell just below the lower limit. Successive distributions differed significantly, showed reduced variability, and indicated more presses, more reinforcements, and more presses per reinforcement. The effect on a given response class was less, relatively, when that class was eliminated from the RZ than it was when a higher response class was eliminated. A modified differentiation procedure was recommended. (Author)

AD-414 735 Div. 28
(TISTB/MS) OTS price $3.60

Stanford U., Calif.
PERCEPTION OF LEADERSHIP IN SMALL GROUPS, AND CORRELATION BETWEEN PEER RATINGS AND BEHAVIOR PATTERNS,
by Hans E. Lee and Lucy E. Burnham. 10 May 63, 38p. TR no. 2
Contract Nonr22562
Unclassified report

Descriptors: (*Leadership, Psychometrics), Group dynamics, Aptitude tests, Projectile techniques, Personality.

Multiple correlation analyses were carried out with 44 variables, 43 of which were selected from scales of the Strong Vocational Interest Blank, the MMPI, the TAT, the Guilford-Zimmerman Temperament Survey, the Leadership Opinion Questionnaire, the Ghiselli Self-Description Inventory, the F Scale, and tests of Personnel Problems, Practical Judgment, and Imaginary Events; grade point average was the other variable. The study was designed to assess whether or not these variables were related to the subject's being rated as desirable or as undesirable to have as a boss. 135 men who were candidates for the Masters in Business Administration degree were used as subjects. The most predictable of three criteria was the number of positive boss ratings received. The best and only stable predictor of the number of times a student is rated by his peers as desirable to have as a boss is the grade point average earned in the two year MBA program. When this was tested on a different sample of subjects, the predicted number of positive boss ratings received correlated +0.50 with those received. (Author)

AD-414 748 Div. 28
(TISTB/WA) OTS price $2.60

Duke U., Durham, N. C.
A PHYSIOLOGICAL EFFECT OF COGNITIVE DISSONANCE UNDER STRESS AND DEPRIVATION,
by Mary L. Brehm, Kurt W. Back and Morton D. Bogdonoff. 1963, 13p. TR8
Contract Nonr118111, Proj. NR177 470
Unclassified report

Descriptors: (*Starvation, Perception), Motivation, Physiology, Stress (Psychology), Fatty acids, Blood plasma.

An experiment and a partial replication were conducted to relate the change of motivation due to dissonance reduction and committment to physiological changes. Results showed that the subjects who were relatively hungry during commitment showed increase in free fatty acids during the additional hunger period. Another measure which could be derived was the ratio of FFA at puncture to a later resting level (indicative of situational stress). This ratio decreased for subjects in the high dissonance condition and increased for those in the low dissonance condition. In the replication study the same pattern emerges in change of resting level and in the measure of situational stress. There is some indication that the subjects in the replication were initially more committed to the study which shows up in the differences between initial blood samples between the two studies. (Author)

AD-414 769 Div. 28
(TISTB/WA) OTS price $5.60

Naval School of Aviation Medicine, Pensacola, Fla.
RECOGNITION AND IDENTIFICATION OF OBJECTS. A THEORY OF INFERENCE,
by Lee Roy Beach. 18 Mar 63, 50p.
NSAM Monograph 6 Unclassified report

Descriptors: (*Psychology, Theory, Modular space construction, Probability, Behavior.

AD-414 776 Div. 28, 32
(TISTM/REB) OTS price $6.60

System Development Corp., Santa Monica, Calif.
AN INFORMATION-SYSTEM APPROACH TO THEORY OF INSTRUCTION WITH SPECIAL REFERENCE TO THE TEACHER,
by David G. Ryans. 20 Mar 63, 65p. SP1079
Unclassified report

Descriptors: (*Communication theory, Instructors), (*Instructors, Behavior), Information retrieval, Learning.

This is an attempt at conceptualization or theory buildings with respect to the instructional process. The purpose is to block out some of the conditions and behavioral constructs which may be hypothesized to contribute to teacher behavior and the instructional process. In this paper, the writer's position is presented in detail, additional constructs are introduced and emphasized, and an effort is made to look further into some of the implications. The teacher system and the pupil system are described in terms of the essential characteristics of all systems--information flow or information processing. The influencing conditions that have led to this ''information system theory of instruction'' are four: (1) the thinking and the research growing out of a Teacher Characteristics Study, relevant teacher behavior research reported by other investigations, and experience with the data accumulated in connection with the National Teacher Examinations; (2) the introduction of the concepts of ''general system theory''; (3) Sears' direction of attention to the ''dyadic sequence'' as an explanation of social behavior; and (4) the growing interest in concepts associated with information theory and communication theory. (Author)

AD-414 809 Div. 28
(TISTB/WA) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
TESTING FOR EXTRASENSORY PERCEPTION WITH A MACHINE,
by William R. Smith, Everett F. Dagle, Margaret D. Hill, and John Mott-Smith. May 63, 31p.
Proj. 4610
AFCRL 63 141 Unclassified report

Descriptors: (*Parapsychology, Tests), Electronic equipment, Recording systems, Personality, Probability, Statistical analysis, Performance tests, Perception.

Parapsychology, of which extrasensory perception (ESP) is a branch, is not transitory. Since reports of apparently significant ESP performances are increasing in number, it becomes more important to use the most rigorous of experimental techniques in testing the ESP hypothesis. A design of a scientifically rigorous experiment in ESP is presented as an acceptable model for work in this field. This report covers the design of an objective test of three modes of ESP, pretest considerations and planning, final testing, and results obtained using the specially designed testing and recording machine, the VERITAC. Finally, a statistical analysis of the results and a discussion of statistical considerations are presented. (Author)

AD-414 859 Div. 28
(TISTB/AAR) OTS price $1.60

Chicago U., Ill.
(No title).
Final rept., 1 Mar 62-1 Mar 63.
1 Mar 63, 19p.
Grant AF AFOSR62 117
AFOSR 4895 Unclassified report

Descriptors: (*Learning, Theory), Mathematical analysis, Biology, Models (Simulations), Thresholds (Physiology), Stimulation.

AD-414 860 Div. 28, 15
(TISTP/WH) OTS price $2.60

Washington U., St. Louis, Mo.
PARTIAL REDUCTION METHODS IN FACTOR ANALYSIS.
Final rept.,
by Philip H. DuBois, Robert F. Sullivan, Patricia Zwillinger and Joseph S. Hupert.
30 June 63, 1v.
Grant AF AFOSR62 181
AFOSR 4996 Unclassified report

Descriptors: (*Psychometrics, Statistical analysis), (*Correlation techniques, Psychometrics), (*Factor analysis, Statistical analysis), Matrix algebra, Inequalities.

AD-414 888 Div. 28
(TISTB/WA) OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
PREDICTION OF SUCCESS IN TECHNICAL TRAINING FROM SELF-REPORT INFORMATION ON EDUCATIONAL ACHIEVEMENT,
by Leland D. Brokaw. Apr 63, 8p.
Proj. 7717, Task 771705
PRL TDR63 11 Unclassified report

Descriptors: (*Aptitude tests, Military personnel), (*Military personnel, Aptitude tests), Education, Statistical analysis, Military training, Psychometrics, Selection, Mathematical prediction, Correlation techniques.

Educational information about recruits was evaluated for its potential contribution to airman classification. A self-report biographical inventory provided 53 education variables from the responses to 16 questions. Multiple regression analysis for graduates from 8 technical schools (samples from 267 to 820) showed that prediction of technical school success improved significantly when education variables were combined with the aptitude index. The educational information is valid alone, as well as in combination with the aptitude measure, for use in airman selection. (Author)

AD-414 993 Div. 28
(TISTB/WA) OTS price $3.60

Kansas City U., Mo.
THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE.
Aug 63, 23p. Technical rept. nos. 9 and 12
Contract Nonr363401
Unclassified report

Descriptors: (*Perception, Learning), (*Psychomotor tests, Psychology), Display systems, Job analysis, Performance tests, Verbal behavior, Light.

AD-415 033 Div. 28
(TISTB/WA) OTS price $10.50

Florida U., Gainesville.
SCALING GROUP TASKS: A METHOD FOR DIMENSIONAL ANALYSIS,
by Marvin E. Shaw. July 63, 133p. TR1
Contract Nonr580 11, Proj. NR170 266
Unclassified report

Descriptors: (*Group dynamics, Factor analysis), Behavior, Job analysis, Decision making, Scale, Psychometrics, Performance tests.

A method for scaling small group tasks is described, patterned after the Thurstone and Chave attitude scaling techniques. Ten simensions of group tasks were tentatively identified, and 104 group tasks were scaled on each of the 10 dimensions. Limited evidence suggests that the obtained scale values are reasonably reliable and valid. Two factor analyses were completed to determine the degree of independence among the a priori task dimensions. On the basis of the results of these analyses and on certain theoretical grounds, six task dimensions were retained from the original set and described more fully. These dimensions are labelled as follows: Difficulty, Cooperation requirements, Solution multiplicity, Intellectual-manipulative requirements, Intrinsic interest, and Population familiarity. Some of the possible applications of the method are outlined and some suggestions for improving the scaling procedure are listed. (Author)

AD-415 069 Div. 28
(TISTB/WA) OTS price $4.60

Princeton U., N. J.
EXPLORATORY ANALYSIS OF A RESEARCH AND DEVELOPMENT GAME,
by K. W. Terhune and John L. Kennedy. June 63, 1v. Rept. no. 3
Contract Nonr185836
Unclassified report

Descriptors: (*Industrial relations, Industrial research), Simulation, Personality, Performance tests, Economics.

AD-415 079 Div. 28
(TISTB/AAR) OTS price $4.60

Rutgers U., New Brunswick, N. J.
EFFECTS OF TRANSVERSE ACCELERATION ON PERFORMANCE OF TWO RUNNING MATCHING MEMORY (RMM) TASKS,
by Bruce M. Ross, Randall M. Chambers and Richard R. Thompson.
29 May 63, 1v. Rept. no. 9
Contracts N62269 1203 and N62269 1525
NADC MA 6309 Unclassified report

Descriptors: (*Memory, Performance tests), Acceleration, Physiology, Centrifuges, Gravity, Man, Analysis.

The present investigations were undertaken to study the nature of degredation in higher mental functioning which might be produced by exposure of man to transverse G. A running matching memory (RMM) task was selected to study the higher mental functioning. This task involved sequential comparisons of same or different for a present symbol with a symbol occurring at a fixed interval (1-back, 2-back, 3-back, etc.) before the viewed symbol. The first experiment on the centrifuge included 2-back, 3-back and 4-back RMM conditions with a 5-sec interval to perform the memory match. All runs were at 5 G, and all series were 50 symbols in length. Each subject had 5 consecutive series consisting of a pre-test static series, three consecutive dynamic series, and a post-test static series. There were 7 Ss per condition. Results showed task improvement from pre- to post-test over the course of the dynamic runs. However, means (per cent correct) for all series were lower than for control groups performing five consecutive static series away from the centrifuge setting. (Author)

AD-415 115 Div. 28, 16
(TISTB/WA) OTS price $1.60

Pisa U. (Italy).
NEUROPHYSIOLOGICAL STUDIES OF CONDITIONING,
by Gianfranco Ricci. 1 May 63,
Grant AF EOAR62 102
AFOSR 4884 Unclassified report

Descriptors: (*Learning), (*Conditioned reflexes, Reaction (Psychology)), Drugs, Dissociation, Behavior, Atropine, Nervous system, Physiology, Primates.

Atropine, in doses with little or no effect on the EEG arousal, impaired the acquisition of CR in the naive monkey and caused a decreased generalization of the responses to the negative stimulus in well trained animals. In doses sufficient to block the EEG arousal, atropine also caused a disappearance of the CR. In these animals both the EEG arousal and the conditioned responses could be restored by administering eserine. A dissociation between EEG and conditioned responses could be found in the monkey only when amphetamine was given in animals previously treated with atropine. A slight pupillary constriction was found to occur during the first part of the conditioned trial. The facilitation of the visual cortical responses observed during conditioning was found to occur during both the pupillary constriction and the first part of the following period of pupillary dilatation. Therefore, the modifications of the cortical responses to flashes are not related to changes of amplitude of the pupils. This fact is further confirmed by the results of experiments in which the pupils were dilated by tropical application of atropine. (Author)

AD-415 117 Div. 28
(TISTB/CCH) OTS price $4.60

Wisconsin U., Madison.
SPECIAL REPORT ON DRUGS AND SENSORY-FEEDBACK ANALYSIS IN SPACE SCIENCE,
by Karl U. Smith. 1961, 1v.
Grant AF AFOSR61 56
AFOSR 4882 Unclassified report

Descriptors: (*Psychology, Pharmacology), (*Brain, Biochemistry), Sensory mechanism, Aging (Physiology), Drugs, Brain, Nerves, Reserpine, Man, Laboratory animals, Analysis, Space flight, Feedback.

The present project, MH-4785, constitutes an initial program in the science of developmental psychopharmacology. From its inception some six years ago, this program has emphasized application of new methods of environmental research and computer-controlled methods of motion study as the foundation of systematic research on brain biochemistry, development, and aging. A primary program with specific experimental objectives has included studies in three main areas: (a) biochemical analysis of brain neurohormones in development; (b) drug depletion of brain neurohormones in development and aging, using reserpine to deplete the brain catecholamines; and (c) development of analytic sensory feedback systems in animals and in man for studies on drugs and development and aging. New techniques of computer-controlled delayed and displaced sensor-feedback analysis of motions in man have been developed under this project and work is being completed in constructing these systems for drug studies as well as for general investigations of motion in man. (Author)

AD-415 158 Div. 28
(TISTB/CCH) OTS price $1.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
RESEARCH ON DECISION PROCESSES.
Final rept., 1 Dec 61-29 Mar 63,
by Ward Edwards. June 63, 17p. Rept. no. 4902 5F
Grant AF AFOSR62 182
AFOSR 5047

Unclassified report

Descriptors: (*Decision making, Test methods), (*Psychology, Scientific research), Probability, Memory.

The statement of research work read in part as follows: (a) Probability feedback in sequential decision making will be studied by determining courses of action whose probabilities of success will be well-defined functions of the subject's previous choices. Independent variables used in the study will include (1) nature of the dependency of probability of reward on previous choices, (2) number and degress of dependence or independence of the courses of action available and (3) amount and kind of information available to the subject. (b) Probability tracking will be studied by determining courses of action whose probabilities of success vary according to some well-defined function of the number of elapsed trials. Independent variables shall include the form and the continuity or discontinuity of the forcing function which generates the change in probabilities. (c) The psychophysics of probability will be studied by determining the psychophysical properties, in particular the size of just noticeable difference, of sequential and simultaneous displays of probabilities. (d) Concurrent with a, b, and c, theoretical work on general decision making will be done including updating of existing literature surveys and making an attempt to relate concepts useful in explaining decisions to concepts useful in other areas of experimental psychology. (Author)

AD-415 334 Div. 28
(TISTB/AAR) OTS price $4.60

Colorado U., Boulder.
COGNITIVE DETERMINANTS OF ROLE PLAYING,
by O. J. Harvey. 1963, 44p. Tech. rept. no. 3
Contract Nonr1147 07

Unclassified report

Descriptors: (*Psychology, Scientific research), Public opinion, Performance tests, Tolerances (Physiology).

AD-415 335 Div. 28
(TISTB/AAR) OTS price $2.60

Miami U., Coral Gables, Fla.
THE INCENTIVE VALUE OF SOCIAL APPROVAL AND BEHAVIOR IN SMALL GROUPS,
by Michael B. Lupfer and John W. McDavid.
Apr 63, 10p. Technical rept. no. 4
Contract Nonr840 22

Unclassified report

Descriptors: (*Sociology, Acceptability), (*Behavior, Analysis), Sociometrics, Psychology, Motivation, Group dynamics.

In order to explore the relationship between approval-seeking motivation and individual patterns of behavior in small groups, a measure of the incentive value of interpersonal approval and disapproval for an individual was correlated with observations of behavior in four-man discussion groups. The SRS (McDavid, 1962) was used to assess approval needs, and a schema adapted from Bales' Interaction Process Analysis (1950) was employed in categorizing observed behavior as (A) positive social-emotional acts, (B) information-giving, (C) information-seeking, or (D) negative social-emotional acts. Approval-seeking motivation was found to be unrelated to either category of social-emotional (maintenance function) behavior, but was correlated negatively with information-giving and positively with information-seeking for females, though not for males. For females, approval-seeking motivation was correlated negatively with an index of tendency to be active and directing, as opposed to passive and submissive, in task-related activity. (Author)

AD-415 342 Div. 28
(TISTB/WA) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
SHORT-TERM TREATMENT OF LEARNING DIFFICULTY IN A CHILD,
by Mark A. Nessel. July 63, 4p.
SAM B Review 5 63 Unclassified report

Descriptors: (*Learning, Children), Behavior, Therapy, Reading, Stress (Psychology), Nervous system, Psyciatry.

Emotional stresses in a child may at times result in learning difficulties. A reading problem is presented that occurred after the child was separated from the father. The mother's reaction and personality have been stressed as important factors contributing to the child's difficulties. An awareness of the psychodynamics involved and, in appropriate cases, supportive short-term therapy, focusing attention on the parent, may be helpful to the physician encountering this problem. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-414 182 Div. 29
(TISTM/TCG) OTS price $1.60

Truesdail Labs., Inc., Los Angeles, Calif.
OPTIMAL WATER STORAGE STUDY OF MULTIFUNCTIONAL WATER-COMMODE CONTAINERS.
Rept. no. 4 (Final), 30 Apr 62-29 Apr 63,
by I. Bandziulis and C. L. Blohm. 29 Apr 63, 15p
Contract DA19 129 qm 1990, Proj. 2210.8
Unclassified report

Descriptors: (*Water, Storage), (*Storage tanks, Water), (*Laminated plastics, Water tanks), Fibers, Polyethylene plastics, Cellulosic plastics, Vinyl plastics, Films, Chemical analysis, Bacteria, Costs, Containers, Test methods, Temperature, Humidity.

Data are presented on potability of a single source tap water stored in fiber drums lined with polyethylene, laminated polyethylene-cellophane and polyvinyl films, and on comparative storability in these liner materials of tap waters from 10 different geographical areas. Total storage period for both cases was 300 days with intra-period inspections. Storage conditions were 45 to 99 F, 20 to 90% relative humidity, indoors and dry. While all waters were considered potable under emergency conditions, by taste panel tests and chemical and bacteriological analyses, those stored in the laminated and vinyl films had a disagreeable tasts. Only 4 mil polyethylene is considered an acceptable liner for this extended period. No significant differences were found in the comparison tests of the 10 different source waters, with the exception of those from Chicago and Houston. Fiber drums and 4 mil polyethylene liners are considered satisfactory for storage of potable tap water under the conditions used. Storage cost data are presented. (Author)

AD-414 363 Div. 29
(TISTB/AAR) OTS price $2.60

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
SURVEY OF FOOD PREFERENCES OF U. S. SOLDIERS.
Preliminary rept. of 1963,
by Joseph M. Kamen. July 63, 27p.
QFCIAF Rept. no. 5 63 Unclassified report

Descriptors: (*Food, Selection), Candiments, Fruits, Bread, Beverages, Eggs, Meat, Seafood, Vegetables.

AD-414 398 Div. 29
(TISTB/WA) OTS price $2.60

Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.
DYNAMIC SIMULATION OF THE A4D FLASH BLINDNESS PROTECTIVE SYSTEM,
by Gloria T. Chisum, J. H. Hill, Carl F. Schmidt and W. S. Wray. 25 July 63, 16p.
NADC MA 6312 Unclassified report

Descriptors: (*Flashblindness, Shielding), (*Shielding, Flashblindness), Aircraft canopies, Protective mask facepieces, Eyeglasses, Simulation, Pilots, Helmets.

Operation of the A4D thermal protective system consisting of a buggy-top thermal enclosure and ELF goggles was evaluated under acceleration stresses of 1.2 to 5 G. Five experienced pilots and three non-pilot subjects operated the system within empirically predetermined limits of safety. All subjects were within the 5th to 95th percentile size range of navy pilots. Subjects in the lower third of the size range exhibited greater facility in operation of the system than those in the upper two-thirds of the size range. Recommendations are made for the location of spare ELF goggles in the A4D cockpit and preferred procedures to be followed in the operation of the thermal protective system. (Author)

AD-414 720 Div. 29, 11
(TISTB/AAR) OTS price $7.60

Detroit Arsenal, Center Line, Mich.
TEST OF PERSONNEL HEATERS, GASOLINE BURNING TYPE, FOR MILITARY VEHICLES.
Final rept., 11 Jan 52-Jan 56,
by Max S. Koga. 14 Feb 56, 1v.
DA Rept. no. 3431 Unclassified report

Descriptors: (*Heaters, Personnel), Military personnel, Vehicle heaters, Vehicles, Gasoline, Effectiveness, Vibration, Tests, Distribution, Ordnance.

AD-414 918 Div. 29, 14, 26, 16
(TISTM/ODN) OTS price $1.60

Truesdail Labs., Inc., Los Angeles, Calif.
OPTIMAL WATER STORAGE STUDY OF MULTIFUNCTIONAL WATER-COMMODE CONTAINERS.
Rept. no. 4 (Final), 30 Apr 62-29 Apr 63.
29 Apr 63, 15p. Rept. no. R341
Contract DA19 129qm1990
Unclassified report

Descriptors: (*Water, Storage), (*Containers, Water), Tank liners, Water tanks, Polyethylene plastics, Vinyl plastics, Costs, Cellulosic plastics, Films, Data, Chemical analysis, Tests, Temperature, Humidity, Bacteria.

Data are presented on potability of a single source tap water stored in fiber drums lined with polyethylene, laminated polyethylene-cellophane and polyvinyl films, and on comparative storability in these liner materials of tap waters from 10 different geographical areas. Total storage period for both cases was 300 days with intra-period inspections. Storage conditions were 45 to 95 F, 20 to 90% relative humidity, indoors and dry. While all waters were considered potable under emergency conditions, by taste panel tests and chemical and bacteriological analyses, those stored in the laminated and vinyl films had a disagreeable taste. Only 4 mil polyethylene is considered an acceptable liner for this extended period. No significant differences were found in the comparison tests of the 10 different source waters, with the exception of those from Chicago and Houston. Fiber drums and 4 mil polyethylene liners are considered satisfactory for storage of potable tap water under the conditions used. Storage cost data are presented. Improved drums and liners for more rigorous storage conditions should be investigated. (Author)

Division 29 - QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-415 070 Div. 29, 5, 8
(TISTB/CCH) OTS price $1.60

Harpur Coll., Endicott, N. Y.
THE PARTIBLE TYPEWRITER: A TASK FOR LABORATORY STUDIES OF SMALL GROUP ORGANIZATION,
by Donald B. Trow. June 63, 10p. TR1
Contract Nonr3679, Proj. NR170 331
Unclassified report

Descriptors: (*Typewriters, Operations), Data, Data processing system, Communication system, Electronics, Electrical equipment, Control, Control systems, Decision making, Group dynamics.

A new apparatus and task, which are described, make possible the collection of reliable data on the process of group organization in small laboratory groups. The task is of medium complexity and permits the groups to innovate any of several systems of operation specifiable in advance. (Author)

AD-415 280 Div. 29
(TISTB/CCH) OTS price $1.10

Spacelabs Inc., Van Nuys, Calif.
DYNAMIC MEASUREMENTS OF PROTECTIVE MASKS.
Monthly progress rept. no. 1, 1-31 July 63.
31 July 63, 2p.
Contract DA18 108AMC228
Unclassified report

Descriptors: (*Protective masks, Measurement), Operation, Air, Pressure, Detection.

The objective of this contract is to develop and produce an electro-mechanical system capable of detecting, measuring in a linear manner, and recording rapidly changing air pressure inside of and airflow through the protective mask during mask wearing by soldiers under dynamic operating conditions. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-414 382 Div. 30, 8, 25
(TISTP/MFA) OTS price $1.60

Defense Research Lab., U. of Texas, Austin.
(No title).
Progress rept. no. 3, 1 Apr-30 June 63.
18 July 63, 8p.
Contract NObs88181, Proj. SF013 11 01, Task 1359.
Unclassified report

Descriptors: (*Analog computers, Design), (*Acoustic impedance, Measurement), (*Mechanical properties, Analysis), Circuits, Oscillators, Special purpose computers, Instrumentation, Tests, Frequency, Tracking, Automatic.

A special purpose electronic analog computer has been built. A preliminary trial of the computer brought attention to several minor circuit difficulties such as inaccuracy of frequency tracking, and noise and crosstalk between two similar information channels. Changes have been made to render some of these defects less serious. A ±10 dB reduction of the dynamic range limitation imposed by combined noise and crosstalk has been realized. Additional improvements are being considered. Mechanical impedances of a previously studied structure were measured, using the computer. Comparison of the results with data obtained earlier shows good agreement although the frequency tracking error is in evidence. The automatic computing system resolved features of the impedance characteristics of the system that were previously overlooked. (Author)

AD-414 397 Div. 30
(TISTB/AAR) OTS price $10.50

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
CHINESE-ENGLISH MACHINE TRANSLATION RESEARCH.
Final rept.
10 June 63, 131p.
Contract AF30 602 2479
RADC TDR63 303
Unclassified report

Descriptors: (*Machine translation, Design), Analysis, Scientific research, Machines, Language, Vocabulary.

A study of the requirements of an operational Chinese-English machine translation system utilizing the techniques of the AN/GSQ-16 (XW2) Language Processor has led to the design and fabrication of a Chinese Character Coding Device, the Sinowriter, and the compilation of a Chinese-English multipass lexicon based on grammatical analysis. The results of the input coding study are presented, along with linguistic research studies and multipass Chinese-English processor techniques. A section of this report will be devoted to recommendations for future Sinowriter systems and for linguistic as well as lexicographical efforts required to ultimately perform Chinese-English machine translation on a random basis. (Author)

AD-414 456 Div. 30
(TISTP/JP) OTS price $1.60

Arizona U., Tucson.
A MASTER CONTROL CLOCK SYSTEM FOR A HYBRID DIFFERENTIAL ANALYZER,
by R. L. Maybach, E. P. O'Grady and J. V. Wait.
May 63, 13p. ACL memo no. 81
Grant AF AFOSR89 63
AFOSR 5181 Unclassified report

Descriptors: (*Analog digital computers, Clocks), Pulse generators.

The control clock system which was developed as part of the hybrid differential analyzer project is discussed. In this system, machine computation proceeds in alternate analog and digital computing intervals. The precise generation of these time intervals, and the command of the solution read-out time are the principal functions of the clock system. (Author)

AD-414 506 Div. 30, 20
(TISTP/REB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ION COUNTER,
by A. P. Shchetilin. 22 June 63, 4p.
FTD TT63 433 Unclassified report

Trans. from Russian Patent no. 147263, (Appl. no. 728192/26, pp. 1-3, 27 April 1961).

Descriptors: (*Radiation measurement system components, Ions), (*Ions, Counting methods), Design.

AD-414 525 Div. 30, 15
(TISTP/MFA) OTS price $2.60

RAND Corp., Santa Monica, Calif.
QUASILINEARIZATION, SYSTEM IDENTIFICATION, AND PREDICTION,
by R. Bellman, H. Kagiwada, and R. Kalaba.
Aug 63, 17p. Memo. RM3812PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Control, Theory), (*Adaptive control systems, Design), Numerical analysis, Boundary value problem, Functions, Equations, Measurement, Programming (Computers), Optimization.

An adaptive controller is one which has the capability of learning about unknown aspects of a system being controlled and then modifying its control regime in an effort to improve the quality of the control exerted. A mathematical formulation and computational solution of the problems of system identification and the determination of unmeasurable state variables on the basis of observations of a process, two topics of central importance in the design of adaptive controllers are presented. The approach suggested--based on the theory of quasilinearization--is an outgrowth of continuing RAND research on the computational solution of multi-point boundary-value problems. The paper should be of interest to control engineers and numerical analysts. (Author)

AD-414 529 Div. 30, 25
(TISTE/CAM) OTS price $31.50

Naval Ordnance Test Station, China Lake, Calif.
TEMPERATURE TABLES, TWO-LAYER PLATE, ONE-SPACE VARIABLE, LINEAR,
by H. N. Browne, Jr. and C. J. Thorne.
8 Oct 59, 406p.
NAVORD Rept. no. 5562, pt. 7, Vol. 2; NOTS TP2182
Unclassified report

Descriptors: (*Temperature, Tables).

Division 30 - RESEARCH AND RESEARCH EQUIPMENT

AD-414 534 Div. 30
(TISTP/JP) OTS price $2.60

Frankford Arsenal, Philadelphia, Pa.
PRINT EDIT ROUTINE GENERATOR (PERGE),
by Donald L. Wright. Feb 63, 18p.
FA Memorandum rept. no. M63 27 1
Unclassified report

Descriptors: (*Programming (Computers), Digital computers), Programming languages.

The routine (program) developed for the UNIVAC Solid State 90 Computer to edit and print a line of numerical information on the high speed printer is discribed. The details of the construction of the routine has proven very useful for work at this arsenal and it is presented in this report to make it available to other users of the USS-90 machine. The general ideas may also find application in the work of other type computers. (Author)

AD-414 536 Div. 30
(TISTE/OHD) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
VACUUM LEAK DETECTION AS APPLIED TO MAJOR SPACE ENVIRONMENTAL CHAMBERS,
by S. P. Ansley, Jr. and R. B. Williams.
Aug 63, 29p.
Contract AF40 600 1000, Proj. SM2301
AEDC TDR63 142 Unclassified report

Descriptors: (*Altitude chambers, Vacuum apparatus), (*Test facilities, Space environmental conditions), (*Detection, Vacuum apparatus), Test methods, Soaps, Dyes, Mass spectroscopy.

The role of leak detection in the successful operation of largescale space simulation chambers is discussed and a general leak detection program outlined. Methods, techniques, and equipment capabilities are presented along with the results of an actual leak detection effort conducted on a 10,000-cu-ft space simulation chamber. (Author)

AD-414 538 Div. 30, 8
(TISTE/JBM) OTS price $2.60

RCA Industrial Electronic Products, Camden, N. J.
HIGH-SPEED DATA PROCESSOR SYSTEM RESEARCH.
Interim research rept. no. 16A, 31 Aug-30 Nov 62.
Nov 62, 16p.
Contract NObsr 77523
Unclassified report

Report on Project lightning.

Descriptors: (*Digital computers, Reliability (Electronics)), Data processing systems, Computer logic, Computer storage devices, Tests, Life expectancy, Semiconductor devices, Transitors.

Efforts were continued on the development of a high speed data processing system. The combined logic and memory subsystems were operated in life-test fashion in an effort to define the problems associated with reliable performance. The reliability of the logic sybsystem is at present better than that of the memory subsystem primarily because of the models used in performing the worst-case designs were more accurately predictable, since the signals and noises involved were more of a standard nature. As a result the information obtained from this portion of the work is very meaningful in proving the design predictions. To date, there have been an accumulation of approximately 1,500 hours of running time upon this subsystem. The total number of hours accumulated upon the memory subsystem is appreciably in excess of 1,300. (Author)

AD-414 564 Div. 30, 15
(TISTB/CCH) OTS price $10.10

Thompson Ramo Wooldridge Inc., Canoga Park, Calif.
AN ON-LINE COMPUTING CENTER.
Final rept., 11 Feb 62-11 Feb 63,
by Glen J. Culler and Burton D. Fried. July 63, 118p.
Contract AF30 602 2762, Proj. 5581, Task 558104
RADC TDR63 160 Unclassified report

Descriptors: (*Data processing systems, Digital computers), (*Digital computers, Data processing systems), Programming (Computers), Mathematical logic, Computer logic.

An on-line computing system has been developed which allows direct use of a high speed digital computer by mathematicians and scientists in their specialized fields. This report describes the system in detail from a user's point of view. For reference purposes, the report includes a listing of all computer programs used in the system. (Author)

AD-414 768 Div. 30
(TISTP/FEM) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COMPILING AND INTERPRETING SYSTEMS FOR USE OF STANDARD PROGRAMS FOR THE BESM COMPUTER OF THE ACADEMY OF SCIENCES USSR COMPUTER CENTER
(Kompiliruyushchaya i Interpretiruyushchaya Sistemy Ispol'zovaniya Standartnykh Programm Dlya Mashiny Besm-2 Vts an SSSR),
by V. M. Kurochkin. 9 May 63, 52p.
FTD TT62 1496 Unclassified report

Trans. from Vychislitel'nyy Tsentr AN SSSR, Moskva, pp. 1-57, 1961.

Descriptors: (*Computers, Data processing systems), (*Programming (Computers), Operation), Control sequences, Compilers, Digital computers, Data storage systems, Input-output devices.

In solving problems on automatic computers, it is frequently necessary to make use of standar routines. The existence of a library with a large set of standard routines and a convenient way of using them can substantially simplify and ease the process of preparing problems for solution. Sometimes convenience in making use of standard routines is achieved owing to the fact that the computer includes a special memory device into which the various standard routines may be loaded. For an entire series of reasons, such a solution to the problem may not be considered convenient. One of these reasons is that many computers, including the BESM-2, have no such memory device. A method is described for making use of standard routines with the BESM-2 automatic digital computer. (Author)

AD-414 772 Div. 30
(TISTP/JP) OTS price $11.50

Computation Center, Mass. Inst. of Tech., Cambridge.
RESEARCH AND EDUCATIONAL ACTIVITIES IN MACHINE

COMPUTATION BY THE COOPERATING COLLEGES OF NEW ENGLAND.
Progress rept. no. 10.
Jan 62, 150p.
Contract Nonr184169

Unclassified report

Descriptors: (*Computers, Research program administration), Programming (Computers), Programming language, Artificial intelligence, Digital computers, Mathematical analysis, Statistical analysis.

Use of the IBM 709 at the Center reached a new high during the fall of 1961, as is shown in the accompanying graphs. The Cooperating Institutions used their full quota, for the first time, and the MIT usage was such that week-end runs were necessary to remove the back-log each week. It was with considerable relief that the staff greeted the installation of the new 7090 at the end of the year. This new facility will enable the Center to process 3 or 4 times the amount of work handled by the 709. It is expected, however, that the 7090 will reach saturation before the end of the year. A pilot model of a time-sharing console has been attached to the 709, serving to test the programs and operating system which had to be developed for its use. On the basis of the experience gained, three consoles will be attached to the 7090 in the coming spring, to initiate tests-in-use of the system. Work in the field of Artificial Intelligence is continuing, both in regard to problem-solving systems in general and in regard to game-playing programs in particular. (Author)

AD-414 777 Div. 30
(TISTB/MS) OTS price $3.60

System Development Corp., Santa Monica, Calif.
CO-OCCURRENCE AND DEPENDENCY LOGIC FOR ANSWERING ENGLISH QUESTIONS,
by Robert F. Simmons, Sheldon Klein, and Keren McConlogue. 3 Apr 63, 29p. Rept. no. SP1155
Contract SD97

Unclassified report

Descriptors: (*Programming lauguages, Information retrieval), (*Machine translation), (*Data processing systems), Digital computers, Language.

States that one of most attractive approaches to language processing on computers is the research on program systems that enable the computer to answer natural English questions. Discusses the kinds of information contained in a question that can be used to identify an answering statement. The content words, the question words and the function words of the question have all been seen to offer important cues which can be used to help identify an answer. Describes how the information-rich statements which may contain answers are found from searching a large corpus of text, and the techniques for actually using the dependency analysis to select from potential answering statements those which are most probably the answers. (Author)

AD-414 793 Div. 30
(TISTB/JAB) OTS price $6.60

RAND Corp., Santa Monica, Calif.
SOVIET CYBERNETICS TECHNOLOGY: II GENERAL CHARACTERISTICS OF SEVERAL SOVIET COMPUTERS,
by Willis H. Ware and Wade B. Holland. Aug 63, 61p. Memo. no. RM3797PR
Contract AF49 638 700

Unclassified report

Report on Proj. RAND.

Descriptors: (*Computers), (*Cybernetics), Handbooks.

A short translation introducing the subject of Soviet Computing technology and specifying some areas of computer application considered to be of special importance is presented. The 'Ural' and BESM series of computers are widely known and well covered in the literature. The 'Ural-4' is the most recent member of that series. The BESM-II described would appear to be a modified version of that machine, since the description contained herein does not agree with the bulk of the literature concerning it. The 'Razdan-2' represents a major effort by one of the newer computing centers to pioneer new design techniques. The 'Razdan' series was the first in the Soviet Union to be fully transistorized. Two analog computers, the MN-10 and MN-14, are also described followed by a brief, non-technical article on the Byelorussian 'Luch' computer. The 'EPOS' being built in Czechoslovakia, which, although considerably behind the U. S. and the Soviet states of the art, was being designed for serial production. (Author)

AD-414 803 Div. 30
(TISTP/FR) OTS price $1.60

Brown Engineering Co., Huntsville, Ala.
A FORTRAN SUBROUTINE TO CALCULATE AMBIENT PROPERTIES AT VARIOUS ALTITUDES,
by W. B. Warren. Apr 63, 9p. Rept. no. Technical note R45
Contract DA01 0090RD1068

Unclassified report

Descriptors: (*Programming (Computers), Atmosphere), Barometric pressure, Density, Temperature, Sound, Velocity, Acceleration.

A subroutine uses geometric altitude either in metric or English units to calculate the corresponding atmospheric pressure, density, temperature in both Rankine and Kelvin, speed of sound, and acceleration due to gravity. The subroutine will compute in either English or metric units. A control card is used to make this choice. The program is written in FORTRAN II. (Author)

AD-414 814 Div. 30, 2
(TISTP/WH) OTS price $7.70

Brown Engineering Co., Huntsville, Ala.
A FORTRAN PROGRAM FOR THREE-DEGREE OF FREEDOM TRAJECTORIES, REFERENCED TO GEOCENTRIC COORDINATES AND TO AN ARBITRARY POINT ON THE EARTH'S SURFACE,
by H. M. Minshew. May 62, 65p. Technical note R48

Unclassified report

Descriptors: (*Programming (Computers), Guide missile trajectories), (*Guided missile trajectories, Synthesis), Ballistics, Equations, Motion, Programming languages, Geodesics.

This report describes a FORTRAN II computer program for generating synthetic ballistic vehicle trajectories. The vehicle is considered to have a constant ballistic coefficient and to be under the influence of gravitational, aerodynamic, centrifugal and Coriolis forces. The program contains provisions for computing the trajectory in the reference frame of an arbitrarily located radar station. (Author)

AD-414 824 Div. 30, 12
(TISTP/WH) OTS price $4.60

Brown Engineering Co., Inc., Huntsville, Ala.
A FORTRAN PROGRAM TO CALCULATE BOOST PHASE

TRAJECTORIES,
by John B. Middleton, Jr. Mar 63, 35p. Technical note R 37
Contract DA01 0090RD1068
Unclassified report

Descriptors: (*Programming (Computers), Ascent trajectories), (*Ascent trajectories, Programming (Computers)), Atmosphere, Guided missile trajectories.

This computer program provides launch to burnout, two-dimensional, point mass trajectories. It is a very flexible program in that it may be based on a large variety of conditions used to control the program. The standard atmospheric conditions and gravitational field are included. The two versions of this program are written in FORTRAN II. The most flexible version, SP11A, is card tape approach, but it requires a longer run time. The SP11B is the all-card approach. It can be used on either the IBM 1410 computer or the IBM 1620 equipped to use FORTRAN II. (Author)

AD-414 893 Div. 30, 12
(TISTP/WH) OTS price $3.60

Brown Engineering Co., Huntsville, Ala.
A FORTRAN PROGRAM TO CALCULATE TWO DEGREE OF FREEDOM TRAJECTORIES FOR BALLISTIC VEHICLES,
by H. M. Minshew and T. J. Kroupa, III.
June 63, 32p. Technical note R54
Unclassified report

Descriptors: (*Programming (Computers), Guided missile trajectories), (*Guided missile trajectories, Programming (Computers)), Ballistics, Aerodynamic characteristics, Drag, Atmosphere, Programming languages.

This report describes a FORTRAN II computer program which calculates two-degree of freedom trajectories for ballistic vehicles. The vehicle is assumed to have a constant ballistic coefficient and to be traveling over a flat, non-rotating earth. Atmospheric density, used in computing aerodynamic drag, is based on an exponential function. (Author)

AD-414 967 Div. 30, 15
(TISTP/WH) OTS price $2.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
RAWS II: A MULTIPLE REGRESSION ANALYSIS PROGRAM,
by Wyman Richardson. Aug 63, 21p. Rept. no. 5452 4R
Contracts DA36 039sc85407 and DA36 039AMC00071
Unclassified report

Descriptors: (*Statistical analysis, Programming (Computers)), (*Programming (Computers), Statistical analysis), Analysis of variance, Least squares method, Matrix algebra.

This memorandum gives instructions for the use and operation of a revised version of RAWS, a multiple regression analysis program. The program includes a rule for determining which of up to fifty independent variables are statistically significant, and calculates the coefficients of the least squares linear regression equations in which only the significant variables appear. The output includes the means, standard deviations, and correlation coefficients of the input variables, the regression coefficients, their standard errors and correlations, and an analysis-of-variance table. The available options include fixed point output, choice of four F tables, flexible input format, listing of the input variables and the residuals, the use of preprocessed data, the directed retention of variable, listing of the matrix of the normal equations and its inverse, and the bypassing of the regression analysis to provide the input variable statistics only. (Author)

AD-414 982 Div. 30, 14
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ISOLATION OF METHYLCYCLOPENTANE AND CYCLOHEXANE FROM PETROLEUM FRACTIONS,
by Ye. M. Benashvili. 14 Aug 63, 8p.
FTD TT63 563 Unclassified report

Trans. from Neftekhimiya, 2:2, pp. 160-163, 1962.

Descriptors: (*Petroleum, Chemical analysis), (*Distillation, Petroleum), (*Organic compounds, Cycloalkanes), Test methods, Separation.

AD-414 992 Div. 30, 12
(TISTP/HSS) OTS price $12.00

RCA Defense Electronic Products, Burlington, Mass.
MULTISYSTEM TEST EQUIPMENT.
Quarterly interim technical rept. no. 5, 1 Apr-30 June 63.
30 July 63, 1v. Rept. no. CR63 547 43
Contract DA36 034ORD3650
Unclassified report

Descriptors: (*Ground support equipment), Test equipment), (*Test equipment (Electronics), Reliability), (*Hydraulic systems, Test sets), High frequency, Air cooled, Target acquisition, Test sets.

This report discusses design approaches and progress made during the fifth quarter of the Multisystem Test Equipment program. Included are: generation breakdowns, shelter layouts and reliability goals for the independent configuration of the MTE system; descriptions of breadboard testing of high frequency stimulus components; design considerations for VFO in the AF/RF generator; design and testing of negative regulators; air cooling system for racks; and design of 400-cps power supply. Also, progress on the Hydraulic Test Stand is summarized. (Author)

AD-414 996 Div. 30, 2
(TISTP/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
DEVICE FOR MEASURING THE WATER CONTENT OF CLOUDS IN THE DROP-FORMING STATE AND RAINS,
by I. V. Molokanov. 2 Aug 63, 5p.
FTD TT63 621 Unclassified report

Trans. from Russian Patent Nr. 152106, Appl. Nr. 746678/26-10, pp. 1-4, 3 Oct 61.

Descriptors: (*Meteorological instruments, Moisture), (*Clouds, Water), Drops, Raindrops, Patents.

AD-415 006 Div. 30
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METHOD OF MEASURING ACCELERATIONS,
by V. S. Klimov. 24 July 63, 3p.
FTD TT63 599 Unclassified report

Trans. from Russian Patent No. 152133, (Appl. No. 750402/26-10, pp. 1-2, 2 Nov 1961.

Descriptors: (*Acceleration, Measurement). Radioactivity, Patents.

AD-415 007 Div. 30, 2
(TISTM/REB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE RATE OF DETECTING TEMPERATURE GRADIENT CHANGES BY MEASURING INSTRUMENTS,
by G. S. Gershenzon and K. N. Manuylov.
2 July 63, 4p.
FTD TT63 540 Unclassified report

Trans. from Trudy N.-I. Instituta Gidrometeorol, Priborostr, No. 10, pp. 99-100, 1961.

Descriptors: (*Temperature sensitive elements, Effectiveness), (*Atmospheric sounding, Temperature sensitive elements), Mathematical analysis, Meters, Meteorological instruments.

This report is devoted to the problem of explaining the ability of the instrument to react to changes in rate of heating or cooling and object of measurement, i. e. in case of change in vertical temperature gradient during vertical sounding the atmosphere. (Author)

AD-415 032 Div. 30
(TISTE/OHD) OTS price $16.50

Marquardt Corp., Van nuys, Calif.
TURBINE FLOW METER AND CALIBRATION FACILITY STUDY. Final rept.
Aug 62, 1v. Rept. no. FE269 3
Contract AF04 611 7548
Unclassified report

Descriptors: (*Flow meters, Turbines), (*Instrumentation, Calibration), Theory, Liquid rocket propellants, Analysis, Test facilities, Design.

Turbine meter theory and practice are reviewed. Current proctices in calibrating turbine-type flow meters using water or a standard hydrocarbon to determine K factors for application to storable propellants are examined and found unsuitable for accurate work. Correlation data in literature and private files are inadequate. Criteria are provided for the design of calibration facilities to provide direct calibration on propellants. An unusual technique recently developed in the petroleum industry may greatly increase both accuracy and reliability. (Author)

AD-415 038 Div. 30
(TISTB/AAR) OTS price $12.50

Rand Corp., Santa Monica, Calif.
ARMY COST MODEL PROGRAMMERS' REFERENCE MANUAL,
by C. L. Baker. July 63, 170p. RM3721ASDC
Contract SD83
Unclassified report

Descriptors: (*Programming (Computer), Instruction manuals), (*Programming languages), (*Costs, Models (Simulations), Defense systems, Computers, Army.

This Memorandum presents detailed information, which, in addition ot the program listing, is necessary to programmers working with the Army Cost Model. The Army Cost Model is programmed in the language of the RAND-SOS Operating System for the IBM 7090, operating under the control of the MocDonald Monitor. Machine operating instructions are also included. The program documentation analysis is presented, providing facility to alter the program, effect major reprogramming, or trace the program's flow. The bulk of the Memorandum is in the Appendices, which cross-reference the assembly listing, outline the various routines, present the input sheets and examples of the output format, and provide flow charts of routines. (Author)

AD-415 096 Div. 30., 1, 15
(TISTP/HG) OTS price $4.60

Dikewood Corp., Albuquerque, N. Mex.
A MATHEMATICAL EVACUATION MODEL,
by S. D. Stearns. 22 Feb 63, 38p. DC TR1030 1
Contract OCD OS62 248
Unclassified report

Descriptors: (*Mathematical models, Simulation), (*Nuclear explosion damage, Vulnerability), (*Linear programming, Theory), Programming (Computers), Computers, Operators (Mathematics), Sequences, Functions, Equations, Inequalities, Casualties, Civil defense systems.

The mathematical model discussed in this report is meant to be applicable to the problem of planning optimum strategic evacuations, in the sense that expected nuclear attack casualties to a given population are minimized. In the model, an ''attack area'' is divided into sectors. Within each sector, the vulnerability of personnel in various categories representing varying degrees of protection is specified, along with the maximum number of occupants allowed in each category. The allowed movements between sectors must also be specified. The principle problem discussed is that of determining an evacuation plan for a given attack area which minimizes the expected number of post-attack casualties. A linear program for deriving optimum evacuation plans is described, and examples of its operation are given. (Author)

AD-415 139 Div. 30, 26
(TISTM/AMS) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEXAMEMBRANE PRESSURE SENSING ELEMENT,
by M. B. Mayzel'. 25 July 63, 4p.
FTD TT63 654 1 2 Unclassified report

Trans. from Priborostroyeniye, Nr 12, p. 24, 1962.

Descriptors: (*Membranes, Pressure), (*Pressure, Test equipment), (*Test equipment, Pressure), Diaphrams (Mechanics), Measurement, Tensiometers, Pressure gages.

AD-415 170 Div. 30
(TISTM/ODN) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ACCELERATION DATA TRANSMITTER,

by A. A. Leonov. 24 July 63, 3p.
FTD Rept. no. TT63 658/1
Unclassified report

Trans. from Patent Nr. 152000, (Appl. Nr. 765749/26-10, pp. 1-2, 1962.

Descriptors: (*Data transmission systems, Acceleration), (*Acceleration, Data transmission systems), Patents, Accelerometers.

AD-415 321 Div. 30
(TISTP/MB) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
ON THE MINIMAL COVERING PROBLEM,
by S. R. Petrick. June 63, 36p.
Proj. 5632
AFCRL 63 148 Unclassified report

Descriptors: (*Circuits, Switching circuits), Programming (Computers), Programming languages, Special functions, Combinatorial analysis, Algebra.

This paper presents several algorithms for determining those irredundant and minimal clauses that imply a truth function given in conjunctive normal form. Algebraic methods of directly obtaining all minimal clauses or just a single minimal clause are given for use in those cases in which the entire set of irredundant clauses is not required. Programs using the LISP and COMIT Programming Systems and two basic machine codes have been written to evaluate the algorithms of this paper relative to each other and to alternative procedures. (Author)

AD-415 421 Div. 30
(TISTP/HG) OTS price $2.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
AN ERROR-CORRECTING PROCEDURE FOR THE PERFECT GOLAY(23,12) CODE,
by Julius Widrewitz. Aug 63, 13p.
Proj. 4027
RADC RAW TM63 7 Unclassified report

Descriptors: (*Programming (Computers), Control sequences), (*Errors, Corrections), (*Coding, Errors), Analysis, Polynomials, Equations, Probability, Number theory, Tables.

There is presented a particularly effective error-correcting procedure for the perfect Golay (23,12) code and the associated UNIVAC 1103A computer decoding scheme. Allowable range in probability of binary digit error is established. Finally, estimated minimum and maximum computer time required for the error-correction procedure is given. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-414 322 Div. 31
(TISTE/CAM) OTS price $3.60

Miller Research Labs., Baltimore, Md.
UNDERWATER MARKER BUOY DEVELOPMENT PROGRAM.
Summary rept. 1 June 61-30 June 62.
by G. H. Jones. 25 July, 62, 36p. Rept. no. ER247 1 62
Contract NOw61 0948c
Unclassified report

Descriptors: (*Mooring buoys, Underwater objects), Design, Carbon dioxide, Materials, Tables, Buoys, Underwater.

Research presented on the Underwater Marker Buoy Development program reviews the work accomplished, hardware delivered, and compares the resultant marker buoy design with the original buoy design. Various materials were investigated and design modifications made based on testing of the engineering models. Five experimental models, 70 marker buoy assemblies, 75 float subassemblies (additional), and 75 CO2 cylinders (additional) were fabricated. Work performed, redesign improvements, and final buoy design are summarized. (Author)

AD-414 572 Div. 31
(TISTE/CAM) OTS price $6.60

Institute of Engineering Research, U. of Calif., Berkeley.
THE EFFECT OF NONLINEAR STATIC COUPLING ON THE MOTION STABILITY OF A SHIP MOVING IN OBLIQUE WAVES,
by W. D. Kinney. June 63, 56p. Rept. no. NA63 3
Contract Nonr 222 75, Proj. S R009 01 01
Unclassified report

Descriptors: (*Ships, Motion), Water waves, Stability, Theory, Analysis, Equations, Partial differential equations, Differential equations, Nonlinear differential equations, Pitch (Motion), Roll.

The equations of motion of a ship constrained to oscillate in heave, pitch, and roll, while moving ahead with a uniform velocity in oblique waves are studied. It is shown that because of the nonlinear static coupling which is known to exist between these degrees of freedon, the rolling response can become large when the period of wave encounter is in the neighborhood of one half the natural rolling period. In this case the response has a period which is equal to twice the period of the excitation, and which, as a consequence, is nearly equal to the natural period. (Author)

AD-414 680 Div. 31, 9
(TISTE/JBM) OTS price $6.60

Hydronautics, Inc., Laurel, Md.
ON SHIPS WITH ZERO AND SMALL WAVE RESISTANCE,
by B. Yim. June 63, 48p. Technical rept. no. 117 4
Contract Nonr334900, Proj. NR062 266
Unclassified report

Descriptors: (*Ships, Hydrodynamics), (*Hydrodynamics, Ships), Fluid dynamic properties, Motion, Ship hulls, Hydrodynamic configurations Water waves, Theory, Mathematical analysis, Fluid flow.

A study on small wave resistance of ships is presented. Both new theoretical results, previously unreported, and material previously presented are given. (Author)

AD-415 226 Div. 31, 2
(TISTE/JBM) OTS price $1.60

Naval Air Station, Norfolk, Va.
THE INFLUENCE OF WEATHER ON REFUELING AT SEA.
by Fred W. Nagle. June 63, 9p.
NWRF 40 0663 074 Unclassified report

Descriptors: (*Refueling, Ships), (*Ships, Refueling), Meteorology, Meteorological parameters, Ice, Wind, Temperature, Water waves, Storms.

Since the beginning of World War II, there has arisen a continuing need to maintain units of the fleet at sea for long periods of time. This has naturally led to the development of refueling and reprovisioning techniques at sea to enable ships to remain on station for extended intervals. Since these techniques are sensitive to environmental conditions, it behooves the naval meteorologist to have some understanding of the problem of reprovisioning at sea and, in particular, of those meteorological elements which exhibit an adverse effect on refueling operations. This publication is intended to fulfill this need. (Author)

AD-415 256 Div. 31
(TISTM/AMS) OTS price $3.60

Little, Arthur D, Inc., Cambridge, Mass.
MARINE CORROSION AND FOULING.
July 62, 32p. 1240762
Contract NObsr81564, Proj. S7001 0307
Unclassified report

Report on Proj. trident.

Descriptors: (*Fouling, Marine biology), (*Corrosion, Sea water), (*Sea water, Corrosion), (*Marine biology, Fouling), Iron alloys, Stainless steel, Pipes, Metals, Alloys, Acrylic resins, Experimental data, Data, Electrochemistry, Protective treatments, Oxygen, Stresses, Coatings, Cladding, Cathodic protection, Wood, Plastics, Paints, Temperature, Copper, Brass, Bronze, Copper alloys, Nickel alloys, Aluminum, Aluminum alloys, Titanium, Chromium alloys.

The nature, causes, and prevention of marine corrosion and fouling are reviewed. Emphasis is given to those anticipated TRIDENT problems which lie outside the more familiar corrosion and fouling experience. In particular, an effort is made to determine to what extent coastal waters test data, and service data from ships, buoys, and cables may be applied to other environments and devices. The electrochemical mechanism of corrosion is discussed as a framework for understanding the effects of the various factors which influence corrosion rate; for example, temperature, oxygen concentration, acidity, bimetallic coupling, organic excretions, and protective coatings. Mention is made of such special problems as pitting, stress corrosion cracking, and interaction of fouling with corrosion. Marine fouling, together with the destructive effects of marine borers on woods and plastics, varies widely and often unpredictably with geographical location, temperature, water velocity, depth and a host of other factors. Current knowledge of corrosion and fouling effects are summarized. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-414 231 Div. 32, 26
(TISTM/AM) OTS price $2.60

System Development Corp., Santa Monica, Calif.
TECHNOLOGICAL PROGRESS AS IT AFFECTS THE FIRE SERVICE OF THE FUTURE.
by Hilton F. Jarrett. 29 May 63, 19p. Rept. no. SP-1040
Unclassified report

Descriptors: (*Fires, Personnel), Safety, Training, Personnel management, Reports, Analysis.

AD-414 396 Div. 32, 17, 14
(TISTM/TCG) OTS price $1.50

Belfour Engineering Co., Suttons Bay, Mich.
MECHANICAL PROPERTIES DATA CENTER DESIGN AND OPERATION.
Final rept. 15 June 62-15 May 63,
by F. L. Stulen. May 63, 50p.
Contract AF33 657 9149, Proj. 7381, Task 738103
ASD TDR63 566, pt. 1 Unclassified report

Report on Material Application.

Descriptors: (*Metals, Mechanical properties), (*Plastics, Mechanical properties), (*Information retrieval, Mechanical properties), Data processing systems, Data storage systems, Design, Shear stresses, Bearings, Creep, Impact shock, Cryogenics, Tensile properties, Fracture (Mechanics), Reinforcing materials, Documentation.

This report discusses and describes the concepts and considerations as well as design details of a system capable of storing and retrieving mechanical properties information of metals and reinforced plastics. Included is a description of IBM card layout and codes utilized to store, retrieve, operate on and display the most pertinent numeric and alphabetic information necessary to the description of reported test procedures and results. Examples of graphic and tabular system output are also presented. (Author)

AD-414 521 Div. 32, 30, 15
(TISTB/CCH) OTS price $3.60

Northwestern Technological Inst., Evanston, Ill.
DEMON: DECISION MAPPING VIA OPTIMUM GO-NO NETWORKS. A MODEL FOR NEW PRODUCTS MARKETING,
by A. Charnes, W. W. Cooper, J. K. DeVoe and D. B. Learner. July 63, 33p. RM79
Contracts Nonr122810 and Nonr76001, Projs. NR047 021 and NR047 011
Unclassified report

Descriptors: (*Decision making, Economics), (*Economics, Decision making), Mathematical analysis, Models (Simulation), Analysis.

This report covers certain research which has been directed to analyzing and systematizing historically independent market research steps into a rational marketing program for introducing a new product. In the general case, this system is applicable to many situations where dicisions under uncertainty must be made in the light of incomplete and not necessarily comparable data. The system's inter-relationship of tasks and decisions can best be illustrated and formalized by means of a network. The links of the network represent research tasks and the nodes represent evaluations or decisions undertaken in the light of all prior information. These alternatives together with their associated costs and risks are used to determine an optimal course of action for acquiring further information to achieve an optimum goal. (Author)

AD-414 713 Div. 32, 30, 18
(TISTB/CCH) OTS price $3.60

Planning Research Corp., Los Angeles, Calif.
DOCUMENT STORAGE AND RETRIEVAL TECHNIQUES -- APPENDIX -- INDEXING TECHNIQUES, DESCRIPTION AND BACKGROUND,
by Donald V. Black. 13 June 63, 29p. PRC D634A
Contract Nonr366500
Unclassified report

Report on Appendix to Navcossact Report no. 0024.

Descriptors: (*Command and control systems, Naval operations), (*Data storage systems, Subject indexing), (*Information retrieval, Command and control systems), (*Subject indexing, Test methods), Automatic, Economics.

This appendix was produced as a part of PRC D-634 and is intended as background material to that document. In addition, a technique of automatic indexing is described. (Author)

AD-415 026 Div. 32
(TISTB/CCH) OTS price $1.60

Thompson Ramo Wooldridge, Inc., Canoga Park, Calif.
MACHINE TRANSLATION OF SPEECH INTO ORTHOGRAPHIC ENGLISH,
by Paul L. Garvin and Peter N. Ladefoged.
10 May 63, 8p. Technical note no. 2
Contract AF49 638 1186
Unclassified report

Descriptors: (*Machine translation, Speech), (*Speech, Machine translation), Voice communication system, Sound pitch, Speech recognition, Speech representation.

AD-415 058 Div. 32
(TISTB/AAR) OTS price $6.60

George Washington U., Washington, D. C.
A STUDY OF THE UTILITY CONCEPT IN ECONOMICS,
by George Madison Lady. 17 May 63, 53p. T157
Contract Nonr761, Projs. NR345 107; NR047 001
Tasks 03; 05
Unclassified report

Thesis submitted requirements for degree of Master of Arts.

Descriptors: (*Economics, Theory), Analysis, Selection, Scale, Game theory.

This paper presents some considerations which are relevent to the selection of a utility scale. The procedure for the selection of a scale is the comparison of the analytical potential of a scale with the analytical demands to be made upon it. The analytical potential of a scale may be examined through two general aspects of scales. The operational character of scale values, and The information provided by the scale. (Author)

AD-415 071 Div. 32
(TISTB/WA) OTS price $4.60

Pittsburgh U., Pa.
EFFECTS ON NEGOTIATORS OF THEIR PRIOR EXPERIENCE IN STRATEGY OR STUDY GROUPS,
by Bernard M. Bass. 1 July 63, 39p. Technical rept. 1
Contract NOnr624 14
Unclassified report

Descriptors: (*Group dynamics, Industrial relations), (*Industrial relations, Group dynamics), Economics, Research program administration.

AD-415 328 Div. 32
(TISTB/CCH) OTS price $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
MINIMIZATION PROCEDURES IN PHONOLOGY,
by Stanley R. Petrick. June 63, 27p.
Proj. 5632
AFCRL 63 324 Unclassified report

Descriptors: (*Speech, Sound), (*Sound, Speech), Test methods.

This paper is concerned with the problem of determining the largest set of features that can be collectively eliminated from a distinctive feature matrix, independent of context. A method is presented for obtaining a single maximal set of features or all such maximal sets. A solution to the problem of reintroducing the redundant features by means of minimal rewriting rules is also presented. (Author)

AD-415 336 Div. 32
(TISTB/AAR) OTS price $1.60

San Francisco State Coll., Calif.
THE EFFECT OF CHANGINE SIZE UPON ORGANIZATIONS.
Annual rept. no. 1,
by Frederic W. Terrien. Mar 63, 7p.
Contract Nonr3646 00, Proj. NR177 253
Unclassified report

Report on a partial test of a theory of organization.

Descriptors: (*Scientific organizations, Analysis), (*Management engineering), Education, Military organizations, Theory, Distribution.

This study was made to test the hypothesis that the administrative component of an organization increases in size at a proportionately greater rate than does the containing organization. Work is completed or planned in four fields: education, business, municipal government and the military. To date, the hypothesis has been substantiated in a large sample of California's school districts. The first test in business, in a major banking system, did not support the hypothesis. A second test in business, utilizing a number of general hospitals of various sizes, is presently underway; with one fourth of the sample reviewed, it so far yields a random distribution of administrative component sizes which do not relate to organization size. (Author)

AD-415 339 Div. 32
(TISTB/CCH) OTS price $1.10

Arizona State U., Tempe.
A MULTI-CHANNEL SPEECH ANALYZER,
by Robert Dickie. June 63, 4p.
Contract Nonr2974 03
Unclassified report

Descriptors: (*Speech, Analysis), (*Verbal behavior, Test methods), Language.

The design of the voice key was undertaken initially to improve existing available equipment and to utilize solid state devices in the place of the more common vacuum tubes. Since space was not at a premium, actual layout of the circuitry was not done with miniaturization in mind--rather optimum circuit operation was the goal. As is usually the case, however, the use of solid state elements did reduce the size and weight of the unit considerably. Q1, Q2 and Q3 make up a high gain stable linear amplifier of conventional design. Gain of this circuit is such that a 50 K dynamic microphone will provide ample signal to operate the Key itself. Each state is provided with d. c. and a. c. feedbacks to stabilize the circuit under extremes of operating conditions. Q4 and D1 make up the detector isolator circuit providing a negative going envelope for the integrator trigger section. Isolation is not as complete as one might

desire in extremely critical work, but is sufficient for most application. Also tape recorder outputs for verbal behavior are taken off at the emitter follower Q2; loading effect by Q4 is not evident. (Author)

AD-415 341 Div. 32, 28
(TISTB/CCH) OTS price $3.60

Research Center for Group Dynamics, U. of Michigan, Ann Arbor.
THE EFFECT OF APPARENT PERFORMANCE AND GROUP SUCCESS ON CHANGES IN STATUS WITHIN A GROUP STRUCTURE,
by Eugene Burnstein, Robert B. Zajonc and James J. Taylor. Mar 63, 35p. Technical rept. 22
Contract Nonr1224 34, Proj. Nr170 309
Unclassified report

Descriptors: (*Behavior, Group dynamics), (*Group dynamics, Performance tests), (*Performance tests, Effectiveness), Analysis, Psychology.

This study examined efforts by members under continuous or under intermittent group success to induce a status change which would maximize the value of group performances. Cooperative four man status hierarchies performed a group reaction time task. Members were to react quickly enough to prevent the appearance of a failure signal. The latter was controlled by E, appearing according to a fixed schedule. Group success occurred when at least two members beat the signal (the group was eligible to receive points toward a prize). The extent of success (number of points received) depended on the status of the successful individuals, high status members contributing more to the group total than low status members. Following each block members voted privately on desired status reassignments. On early blocks individual success was scheduled to produce the optimum fit between an occupant's apparent performance and that deemed appropriate to his status. Following block four group success became intermittent for 20 groups and remained continuous for another 20. Concurrently, a discrepancy was induced in each group between the apparent and appropriate frequency of success for a given member. Voting indicated that efforts at status reassignment which restore the fit between apparent and appropriate success occurred more rapidly and more frequently under continuous than under intermittent group success. (Author)

AD-415 343 Div. 32, 28
(TISTB/CCH) OTS price $3.60

Research Center for Group Dynamics, U. of Michigan, Ann Arbor.
THE EFFECTS OF STATUS ON GROUP AND INDIVIDUAL PERFORMANCE,
by Eugene Burnstein, Robert B. Zajonc and James J. Taylor. Mar 63, 39p. Technical rept. 23
Contract Nonr 1224 34, Proj. NR170 309
Unclassified report

Descriptors: (*Group dynamics, Behavior), (*Performance tests, Analysis), Reaction (Psychology), Personality, Psychology.

Reaction time performance was examined in a group setting (1) when status distinctions were introduced, (2) when an occupant's apparent performance was discrepant from that accepted by members as appropriate for his status, and (3) when the group changed a member's status because of a persisting discrepancy. Cooperative four-man groups performed a reaction time task. Members were to react quickly enough to prevent a failure signal from appearing. The latter was controlled by E, appearing according to a fixed schedule. The extent of success depended on the status of the successful members, high status members being able to contribute more points to the total than low status members. Status distinctions were introduced following practice. After each experimental block members privately voted on desired status changes. On the first four experimental blocks, individual success was scheduled to produce an optimum fit between an occupant's performance and that deemed appropriate to his status. After block four discrepancies were induced between apparent and appropriate performance. (1) Introduction of status distinctions produced a general decrease in RT. (2) Later performance changes depended on the direction and extent of the discrepancy between appropriate and apparent success. RT decreased when success became less frequent than that appropriate for the status. (Author)

AD-415 344 Div. 32, 28
(TISTB/AB) OTS price $3.60

Washington U., St. Louis, Mo.
THE INFLUENCE OF EXPERIMENTALLY PRODUCED AFFECT ON TIME PERCEPTION,
by Thomas J. Johnson and Richard deCharms.
21 May 63, 34p. Technical rept. no. 18
Contract Nonr81611, Proj. NR170 424
Unclassified report

Descriptors: (*Behavior, Group dynamics), (*Personality, Theory), (*Behavior, Theory), Group dynamics, Social sciences, Test methods, Emotions, Time, Perception, Stimulation, Light.

The present study investigated the relationship between experimentally induced effect and time perception. Forty-eight female undergraduates were randomly assigned to either a competitive or non-competitive group. The subjects were pretested and after a practice session performed 3 series of puzzlelike tasks. Success and failure was systematically varied and indicated by discrete stimuli. In addition, the success and failure of the competing partner was indicated for subjects in the competitive situation. At the conclusion of each series of puzzles, each of the discrete stimuli (colored lights) was presented to the subject twice for a standard 15'' interval and time estimates were made using the method of reproduction. (Author)

AD-415 458 Div. 32, 30
(TISTM/ODN) OTS price $1.60

Navy Mine Defense Lab., Panama City, Fla.
INTER-SERVICE COMMITTEE ON TECHNICAL FACILITIES SOUTHEASTERN USA.
Annual rept. no. 7.
1962, 17p.
Unclassified report

Descriptors: (*Scientific organizations, Scientific research), Scientific personnel, Technological intelligence, Documentation.

33. TRANSPORTATION

AD-414 409 Div. 33
(TISTA/GEC) OTS price $12.50

Airborne Instruments Lab., Inc., Deer Park, N. Y.
AIRPORT FACILITIES FOR GENERAL AVIATION,
by M. A. Warskow, H. C. Burns, T. Dayton, W. Guidi, and P. H. Stafford. Nov 62, 1v. Rept. no. 1400 1
Contract FAA BRD403, Proj. 412 7R
Unclassified report

Descriptors: (*Airports, Civil aviation), Air transportation, Design, Runways, Instrument landings, Urban areas, Economics, Terminal flight facilities, Airplane noise, Jet plane noise, Air traffic, Navigational aids, Landing aids.

Several criteria relating to the handling of general aviation on airports have been developed. In many cases, modifications of existing criteria are suggested. These include the subjects of runway-length corrections, instrument-approach needs, airspace needs, annual capacity of airports, guidance for planning separate runway facilities for general aviation, procedures for performing economic analyses, and the effects of airport accessibility. The study has concentrated on planning for general aviation in metropolitan areas. Observations of general-aviation operations at air-carrier and general-aviation airports have indicated that new criteria for determining the numbers of airports required in metropolitan areas are needed. In developing regional plans and individual airport plans, the importance of using a cost-versus-benefit economic analysis is stressed. The criteria developed have been tested by applying them to the Lambert-St. Louis airport and to regional planning for the Washington, D. C. area. (Author)

AD-414 417 Div. 33
(TISTM/AM) OTS price $7.60

Wilson Nuttall Raimond Engineers, Inc., Chestertown, Md.
DEVELOPMENT TESTING OF A TEST-BED RIG ON AIR-SUPPORTED TREADS.
Final rept.
June 63, 66p. WNRE rept. no. 87
Contract DA44 177tc600T, Task 1D543006D40406
TRECOM TR63 29 Unclassified report

Descriptors: (*Tracked vehicles, Test equipment), Air, Pressure, Performance (Engineering), Design, Ducted bodies, Measurements.

A test bed for the preliminary evaluation of air-supported treads as possible running gear on off-road transport equipment was constructed earlier in this program. The present report first outlines a modest program of modifications intended to improve performance and/or durability of the original treads, and presents the results of subsequent, brief tests. The changes resulted in reduced internal resistance, reduced air consumption, improved sheave traction, and extended durability. Considerable practical design experience was gained, and data necessary for estimating air consumption of similar devices of different weights and tread dimensions were developed. (Author)

AD-414 520 Div. 33, 19
(TISTA/GEC) OTS price $18.00

Arcon Corp., Lexington, Mass.
SYSTEMS ANALYSIS OF THE NORTH ATLANTIC AIR TRAFFIC COMPLEX.
Final rept.
Dec 62, 283p. R62 3
Contract FAA BRD334, Proj. 116 9R
Unclassified report

Descriptors: (*Air traffic control systems, Air traffic), Jet transport planes, Transport planes, Separation, Wind, Monte Carlo method, Position finding, Errors, Flight paths, Mathematical models.

This report contains a detailed analysis of the North Atlantic Air Traffic Control System. Emphasis is placed upon the effects on system performance of potential modifications in navigation, communications, weather forecasting, aircraft characteristics, control procedures and separation standards. Mathematical models are developed and applied to operational data. The models provide realistic representations of the significant functional characteristics of the basic system areas. The relationships between separation standards and other system configurations. System performance is measured in terms of traffic capacity and economic penalties imposed by air traffic control restrictions. The effects of various system modifications are then determined. Although emphasis is placed on subsonic jet aircraft operations over the North Atlantic, a brief discussion of other environments is also given. (Author)

AD-414 773 Div. 33
(TISTA/GEC) OTS price $5.60

Federal Aviation Agency, Washington, D. C.
F.A.A. PERSONNEL. DEPLOYMENT ORGANIZATION COST.
Preliminary rept.
June 63, 50p.
Proj. 151 1S
Unclassified report

Descriptors: (*Civil aviation, Government employees), Aviation personnel, Costs, Operations research, Distribution, Budgets, Air transportation.

This report represents the second in a series of preliminary studies being prepared in support of a comprehensive program to re-examine all of the services which FAA provides with the intent of configuring the facilities and personnel deployment in a way which makes the best over-all use of the available resources. The intent is to present a concise picture of FAA personnel deployment and cost, as it exists today. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterisk are included in the subject index.

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Argonne National Lab., Ill.
A REVIEW OF ULTRASONIC IMAGING METHODS, WITH A SELECTED, ANNOTATED BIBLIOGRAPHY, by Harold Berger and R. E. Dickens. Jul 63, 32p 74refs
Contract W31-109-eng-38

HW-68600 28 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM ABSTRACTS. VOLUME 3, NO. 6.
1 Jul 63, 8p
Contract AT(45-1)1350

HW-68600 29 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
PLUTONIUM ABSTRACTS. Volume 3, no. 7. 1 Aug 63, 5p
Contract AT(45-1)1350

UCRL-7284 OTS $2.75

Lawrence Radiation Lab., U. of California, Livermore.
SOME PHYSICAL MECHANICAL, AND THERMODYNAMIC PROPERTIES OF TRANSITION METAL REFRACTORY CARBIDES: A BIBLIOGRAPHY, comp. by Jean E. Senkin and M. Temple Milliken. Mar 63, 196p
Contract W7405-eng-48

AGRICULTURE

TID-18161 OTS $8.10

Institute of Agriculture, U. of Minnesota, St. Paul.
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ORO-605 OTS $2.50

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ASTRONOMY

Astrophysics

NASA N63-19948 OTS $9.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
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14 Dec 62, 118p. 48 refs
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22 May 62, 64p 28refs
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Argonne National Lab., Ill.
CELL PROLIFERATION IN THE SMALL INTESTINE: AN EMPIRICIST'S APPROACH TO A BIOLOGICAL PROBLEM, by S. Lesher, W. E. Kisieleski, G. Sacher and R. J. M. Fry. Dec 62, 37p 19refs
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Del Electronics Corp., Mount Vernon, N. Y.
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TID-7633 OTS $3.00

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PROCEEDINGS OF THE CONFERENCE ON PRIMARY PRODUCTIVITY MEASUREMENT, MARINE AND FRESHWATER, HELD AT UNIVERSITY OF HAWAII, AUGUST 21-SEPTEMBER 6, 1961, ed. by Maxwell S. Doty. 245p
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STUDIES OF THE PHYTOHEMAGGLUTININ OF PHASEOLUS VULGARIS AND ITS MITOGENICITY, by Demetrios A. Rigas and Edward A. Johnson. 1963, 43p 56refs
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California Inst. of Tech., Pasadena.
INVESTIGATIONS ON THE BIOGENESIS OF ISOPRENOIDS. Final rept. 1962, 20p 21refs
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California U., Los Angeles. School of Medicine.
NUCLEIC ACID AND PROTEIN SYNTHESIS IN SYNCHRONIZED EUGLENA GRACILIS, by J. R. Cook. 9 Mar 63, 9p 15refs
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California U., Los Angeles. School of Medicine.
SULFONIC ACIDS IN ALGAE, by Isao Shibuya, Tatsuhiko Yagi, and A. A. Benson. 1 Mar 63, 20p 20refs Prepared in cooperation with Pennsylvania State U.
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Lawrence Radiation Lab., U. of California, Berkeley.
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Pathology

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Brookhaven National Lab., Upton, N. Y.
THE HISTORY OF THE BROOKHAVEN BIOLOGY DEPARTMENT MOUSE COLONY NO. 1 (SWISS-BRIDGE-BAGG-O'GRADY-WATER REED STRAIN) WITH ENDEMIC OCCULT CEREBRAL ENCEPHALITOZOONOSIS AND COLONY NO. 2, by J. R. M. Innes and G. Borner. 1962, 21p 8refs
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California U., Los Angeles. School of Medicine.
LIVER BLOOD FLOW ESTIMATES (AVAILABLE TECHNIQUES AND CLINICAL SIGNIFICANCE), by George V. Taplin. Feb 63, 41p 33refs
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Pharmacology and Toxicology

UR-629 OTS $0.50

Rochester U. School of Medicine and Dentistry, N. Y.
A LABORATORY TEST CHAMBER FOR STUDYING AIR-BORNE MATERIALS, by Leonard J. Leach. 2 Aug 63, 11p 5refs
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TID-18138 OTS $3.60

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REACTIONS OF RIBONUCLEOTIDE DERIVATIVES OF PURINE ANALOGS AT THE CATALYTIC SITE OF INOSINE 5' PHOSPHATE DEHYDROGENASE, by Alexander Hampton. 1962, 32p 33refs
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California U., Los Angeles, School of Medicine.
CELLULAR ADAPTATIONS IN GROWTH AND DIVISION EFFECTED BY ENERGY SUPPLY, by J. R. Cook. 12 Mar 63, 58p 23refs
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TID-17451 OTS $2.60

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EFFECT OF SINGLE AND DIVIDED DOSES OF X-IRRADIATION UPON LONGEVITY IN RATS, by B. G. Lamson, M. S. Billings, J. J. Gambino, and L. R. Bennett. 1 Oct 62, 22p
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TID-18625 OTS $1.10

Catholic U. of America, Washington, D. C.
RADIATION STUDIES ON MAMMALIAN CELLS GROWN IN A CHEMICALLY DEFINED MEDIUM, by Roland M. Nardone. [1963] 10p 6refs
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TID-18649 OTS $1.60

Comision Nacional de Energia Atomica, Buenos Aires (Argentina)
STRONTIUM 90 LEVELS IN THE DIETS AND BONES OF CHILDREN. Progress rept. 1962, 17p 12refs
Contract AT(30-1)2753

TID-18268 OTS $1.60

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PROGRESSIVE DETERIORATION OF MUSCLE FINE STRUCTURE IN RINGER SOLUTION, by Adolfo Portela, Juan C. Perez, Peter Stewart, Howard Jenerick, and Marion Hines. 1961, 19p 12refs
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International Atomic Energy Agency, Vienna (Austria).
THE ECOLOGY OF ACANTHARIA IN RELATION TO THE CIRCULATION OF Sr IN THE SEA. Progress rept. by Bruno Schreiber. 16p 6refs
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International Atomic Energy Agency, Vienna (Austria).
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Contract W7405-eng-48

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Lawrence Radiation Lab., U. of California, Berkeley.
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THE TISSUE DISTRIBUTION AND EXCRETION OF CESIUM-137 FOLLOWING INHALATION -PRELIMINARY DATA FOR RATS, by J. F. Stara and R. G. Thomas. Apr 63, 25p 37refs
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Naval School of Aviation Medicine, Pensacola, Fla.
A NOTE ON THE INFLUENCE OF SHIELD GEOMETRY ON AIR DOSE AND TISSUE DOSE FROM PROTONS WITHIN A SPACE VEHICLE, by Hermann J. Schaefer. 25 Apr 63, 18p 7refs
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Oak Ridge Inst. of Nuclear Studies, Tenn.
MEDICAL DIVISION RESEARCH REPORT FOR 1962. 70p 18refs
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RADIO-ECOLOGY OF SMALL VERTEBRATE SPECIES UNDER NATURAL ENVIRONMENTS. Progress rept. Jan 1-Nov 1, 62, by C. A. Tryon, Jr. 26p
Contract AT(30-1)2579

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Radiological Research Lab., Columbia U., New York.
BIOLOGY AND MEDICINE. Annual rept. on Research Project. 1 Jan 62, 171p 69refs
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UR-627 OTS $1.50

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ELEMENTARY EXPERIMENTS IN RADIATION BIOLOGY, by Alison P. Casarett and Thomas P. Davis. 2 Aug 63, 65p 45refs
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TID-18135 OTS $1.60

Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.
THE OCCURRENCE OF CHROMOSOMAL ABERRATIONS IN PRE-SPERMATOCYTIC CELLS OF IRRADIATED MALE MICE. Progress rept., 1 Feb 62-31 Jan 63, by Allen B. Griffen. 1 Feb 63, 19p 21refs
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SOME OBSERVATIONS ON RARE EARTH SALTS OF TRICARBALLYLIC-ACID (PROPANE-1,2,3-TRICARBOXYLIC ACID). HYDRATION AND SOLUBILITY OF THE COMPOUNDS, by Asim K. Gupta and Jack E. Powell. Jul 63, 12p
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Argonne National Lab., Ill.
PROTON MAGNETIC RESONANCE STUDIES OF ACIDIC ORGANOPHOSPHORUS COMPOUNDS, by John R. Ferraro and D. F. Peppard. Dec 62, 11p 19refs
Contract W31-109-eng-38

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Argonne National Lab., Ill.
TABLES OF OXYGEN PRESSURES CALCULATED FROM THE HYDROGEN-WATER SYSTEM AND FROM THE DISSOCIATION OF CUPRIC OXIDE, by L. M. Atlas and J. B. Moser. Jul 63, 9p 4refs
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TID-18136(Pt. I) OTS $3.60

Arizona U., Tucson.
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STRUCTURE OF HUMIC ACID. IV. ELECTRON PARAMAGNETIC RESONANCE STUDIES, by Gordon Tollin, Ted Reid, and Cornelius Stellink. 1962, 5p 6refs
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Brandeis U., Waltham, Mass.
PHOTOCHEMICAL REACTIONS OF COMPLEX MOLECULES IN CONDENSED PHASE. Progress rept. 1 May 62-30 Apr 63, by Henry Linschitz. 15 Mar 63, 13p 4refs
Contract AT(30-1)2003

BNL-800 OTS $0.50

Brookhaven National Lab., Upton, N. Y.
DETERMINATION OF URANIUM AT MICROGRAM LEVELS BY DERIVATIVE POLAROGRAPHY, by Clemens Auerbach and George Kissel. May 63, 8p 9refs
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TID-18423 OTS $1.60

Illinois U. Engineering Experiment Station, Urbana.
KINETICS AND MECHANISMS OF CATALYTIC REDUCTION PROCESSES. Final terminal rept. by Max S. Peters. 15 Mar 63, 13p 10refs
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Lawrence Radiation Lab., U. of California, Berkeley.
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Lawrence Radiation Lab., U. of California, Berkeley.
LONGITUDINAL DISPERSION IN PACKED EXTRACTION COLUMNS, by Alphonse Hennico, Gabriel Jacques, and Theodore Vermeulen. 18 Mar 63, 198p 86refs
Contract W7405-eng-48

UCRL-7168 OTS $1.25

Lawrence Radiation Lab., U. of California, Livermore.
THE THERMODYNAMIC FUNCTIONS FOR CARBON DIOXIDE IN THE RANGE 40 TO 1000°C AND 1 TO 1400 BARS, by W. E. Sharp. 19 Dec 62, 54p 9refs
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VAPORIZATION AND THERMODYNAMIC PROPERTIES OF ZINC OXIDE. Doctoral thesis, by Donald F. Anthrop. 1 May 63, 46p 18refs
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Los Alamos Scientific Lab., N. Mex.
COMPOUNDS OF DIVALENT LANTHANIDES. PREPARATION, OPTICAL PROPERTIES, AND CRYSTAL STRUCTURE, by L. B. Asprey, F. H. Ellinger, and E. Staritzky. 9p 13refs
Contract W7405-eng-36

LA-2900 OTS $4.00

Los Alamos Scientific Lab., N. Mex.
DETONATION PROPERTIES OF CONDENSED EXPLOSIVES COMPUTED USING THE BECKER-KISTIAKOWSKY-WILSON EQUATION OF STATE, by Charles L. Mader. 17 July 63, 324p
Contract W7405-eng-36

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Los Alamos Scientific Lab., N. Mex.
GRAPHITE-HYDROGEN-METHANE KINETICS ABOVE 1600°K, by John D. Rogers and Alexander Sesonske. 26 May 63, 21p 5refs
Contract W7405-eng-36

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THE PREPARATION AND THERMAL DECOMPOSITION OF SOME RARE EARTH CARBONATES, by Earl L. Head, and Charles E. Holley, Jr. 1962, 8p 11refs
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Massachusetts Inst. of Tech., Cambridge
CALCULATION OF PSEUDO-LATTICE ENERGIES AND THE ESTIMATION OF METAL-LIGAND BOND ENERGIES IN SOME TETRAHEDRAL TETRACHLOROMETALLATE (II) COMPLEXES, by A. B. Blake and F. A. Cotton. 15 Mar 63, 29p 20refs
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Massachusetts Inst. of Tech., Cambridge.
KINETICS OF REACTIONS BETWEEN LIQUID METALS AND LIQUID SALTS. Progress rept. 1 Mar-30 Dec 62, by Thomas B. King. 43p 9refs
Contract AT(30-1)1985

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Melpar, Inc., Falls Church, Va.
THE DETECTION OF OXYGEN BY GAS-PHASE POLAROGRAPHY AT LOW TEMPERATURES AND LOW PRESSURES, by Gerald Halpert and R. T. Foley. [1962] 14p 7refs
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Michigan U., Ann Arbor.
ELECTROCHEMISTRY IN PYRIDINE. III. CHEMICAL AND ELECTROCHEMICAL REDUCTIONS OF PYRIDINE, by Andrzej Cisak and Phillip J. Elving. 1 Feb 63, 35p 25refs
Contract AT(11-1)1148
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Oak Ridge National Lab., Tenn.
SURVEY OF RECENT DEVELOPMENTS IN SOLVENT EXTRACTION WITH TRIBUTYL PHOSPHATE, By R. E. Blanco, C. A. Blake, Jr., W. Davis, Jr., and R. H. Rainey. 21 Mar 63, 39p 39refs
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Pennsylvania State U., University Park.
THE MECHANISMS OF FISSION GAS DIFFUSION IN GRAPHITE. Summary rept. 1 Jun 62-31 May 63, by W. S. Diethorn and P. L. Walker, Jr. 1 Mar 63, 31p
Contract AT(30-1)2792

DP-818 OTS $0.50

Savannah River Lab., Aiken, S. C.
EXTRACTION BEHAVIOR OF ZIRCONIUM AT SHORT RESIDENCE TIMES, by Albert A. Kishbaugh. May 63, 18p 7refs
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Savannah River Lab., Aiken, S. C.
SOLVENT EXTRACTION DATA FOR PLUTONIUM, A compilation of data in the literature, by L. L. Smith. Dec 62, 272p 86refs
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Texas Engineering Experiment Station, College Station.
AN INVESTIGATION OF COMPUTER COUPLED AUTOMATIC ACTIVATION ANALYSIS AND REMOTE LUNAR ANALYSIS. Quarterly progress rept. 1 Nov 62-1 Feb 63 by Lloyd E. Fite, Edgar L. Steele, Richard E. Wainerdi, Edward Ibert, and Wayne Wilkins. 65p 5refs
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Wyandotte Chemical Corp., Mich.
INVESTIGATION OF ACTIVATED SPECIES. Summary rept. no. 2, 30 Apr 62-30 Apr 63, by L. E. Kuentzel and R. K. Seizinger. Apr 63, 24p
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TID-18448 OTS $1.60

Yale U., New Haven, Conn.
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Contract AT(30-1)1375

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Yale U., New Haven, Conn.
SOME CONSEQUENCES OF THE RULE FOR THE CALCULATION OF ACTIVITY COEFFICIENTS OF SALTS IN ORGANIC SOLVENT-WATER MIXTURES, by Herbert S. Harned. 1962, 5p 2refs
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Analytical Chemistry

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Hanford Atomic Products Operation, Richland, Wash.
CONTINUOUS MEASUREMENT OF TRACE CONCENTRATIONS OF HARDNESS IN WATER, by T. F. Demmitt and M. C. Burt. May 63, 12p 2refs
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Los Alamos Scientific Lab., N. Mex.
SPECTROPHOTOMETRIC DETERMINATION OF MICRO QUANTITIES OF CHLORIDE IN PLUTONIUM METAL, by Karl S. Bergstresser. May 63, 12p 9refs
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New Brunswick Lab., N. J.
SEMIANNUAL PROGRESS REPORT FOR THE PERIOD JULY 1962 THROUGH DECEMBER 1962, by C. J. Rodden. Aug 63, 58p 5refs

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Phillips Petroleum Co., Idaho Falls.
MANUAL OF ANALYTICAL METHODS FOR EXPERIMENTAL ORGANIC COOLED REACTOR, ed. by T. D. Morgan. 25 Jun 63, 45p 8refs
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IDO-14316(Suppl. 4) OTS $3.00

Phillips Petroleum Co., Idaho Falls.
MANUAL OF THE ANALYTICAL METHODS USED BY THE CONTROL LABORATORY AT THE CHEMICAL PROCESSING PLANT. 31 May 63, 202p.
Contract AT(10-1)205.

TID-18119 OTS $1.60

Rutgers U., New Brunswick, N. J.
ANALYTICAL CHEMISTRY OF THE POLYPHOSPHATES. Final rept. by William Rieman. 28 Feb 63, 15p 28refs
Contract AT(30-1)1306

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Savannah River Lab., Aiken, S. C.
A CONTROLLED-POTENTIAL COULOMETER WITH TRANSISTORIZED POWER AMPLIFIERS, by Robert C Propst. May 63, 30p 6refs
Contract AT(07-2)1

Organic Chemistry

NYO-10178 OTS $2.00

Consolidation Coal Co., Library, Pa.
DEVELOPMENT OF TRITIUM LABELING OF ORGANIC MATERIALS. Final rept. 1 Mar 62-31 Jan 63. 20 Jun 63, 98p 10refs
Contract AT(30-1)2976

GA-3985 OTS $0.75

General Atomic Div., General Dynamics Corp., San Diego, Calif.
PITCH BINDERS FOR GRAPHITE: A SURVEY OF THE LITERATURE, by J. R. Hooker. 7 Mar 63, 29p 89refs
Contract AT(04-3)167

EARTH SCIENCES

AD-404 750 OTS repriced $5.00

Defense Documentation Center, Cameron Station, Alexandria, Va.
OCEANOGRAPHY. A REPORT BIBLIOGRAPHY. Bibliography from 1953-15 Mar 63, comp. by Esther E. Thompson. May 63, 365p 2190refs

DESCRIPTORS: *Oceanology, *Bibliographies, *Marine biology, Aquatic animals, Fishes, Marine borers, Algae, Plankton, Sea water, Chemistry, Desalination, Salinity, Mechanical properties, Structural properties, Ice, Economics, Hydrographic surveying, Marine geophysics, *Marine geology, *Marine meteorology, Beaches, Reefs, Ocean bottom, Ocean currents, Ocean waves, Tides, Measurement, Temperature, Oceanographic equipment, Instrumentation, Scientific research, Symposia.

The scope of this document includes biological, chemical, economic physical and practical, and applied oceanography as well as marine geology and scientific research in these areas. Citations are included for all unclassified reports, without release limitations, that were acquired by DDC from 1953 to 15 March 1963. Although many of these citations are related to more than one of the above categories, on cross-referencing has been attempted, except in the biological oceanography section. References on boring and fouling by sea organisms are included; however, citations on control of corrosion and deterioration by seawater are not included.

MITS-49 OTS $1.00

Massachusetts Inst. of Tech., Cambridge.
THE ADAPTATION OF NEW RESEARCH TECHNIQUES TO MINERAL ENGINEERING PROBLEMS. Semi-annual progress rept. for period ending 31 Oct 62. 31 Jan 63, 45p 3refs
Contract AT(30-1)956
NYO-10327

Climatology and Meteorology

NASA N63-18293 OTS $8.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HIGH RESOLUTION WIND AND WIND SHEAR MEASUREMENT WITH DOPPLER RADAR. Final rept., 5 Apr 61-5 Jun 62, by James E. Jiusto. [1962] 99p 14refs
Contract NAS8-1520
CAL-IH-1525-P-1; NASA CR-50169

NASA N63-18498 OTS $2.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PROJECT FOG DROPS. INVESTIGATION OF WARM FOG PROPERTIES AND FOG MODIFICATION CONCEPTS. Quarterly progress rept. no. 1, 1 Feb-1 May 63, by James E. Jiusto. [1963] 28p 33refs
Contract NASr-156
CAL report no. RM-1788-P; NASA CR-50530.

Geodesy

NASA N63-19960 OTS $2.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
PRECISE ASPECTS OF TERRESTRIAL AND CELESTIAL REFERENCE FRAMES, by George Veis.
30 Apr 63, 24p 7refs
Grant NsG-87-60
SAO Special rept. no. 123; NASA CR-50832

NASA N63-19959 OTS $5.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
NOTES ON THE DESIGN AND OPERATION OF SATELLITE TRACKING STATIONS FOR GEODETIC PURPOSES, by Fred L. Whipple. 27 May 63, 54p 20refs
Grant NsG-87-60
Special rept. no. 124; NASA CR-50801

Geology

RME-4542 OTS $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
PETROLEUM RESOURCES AND URANIUM POSSIBILITIES OF THE PUCALLPA REGION, LORETO DEPARTMENT, PERU, by John W. Gabelman. Jul 59, 21p 5refs

RME-4567(Rev.) OTS $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE SAN PEDRO DE ATACAMA AND LACO AREAS, PROVINCE OF ANTOFAGASTA, CHILE, by Paul H. Knowles, William A. Bowes, Mario Serrano C., and Aldo Moraga B. Dec 61, 21p 12refs Prepared in cooperation with Instituto de Investigaciones Geologicas, Santiago

RME-4549 OTS $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE OF THE IQUITOS AREA, LORETO DEPARTMENT, PERU, by John W. Gabelman and Guillermo Morales S. Jan 60, 12p 2refs Prepared in cooperation with Junta de Control de Energia Atomica.

RME-4541 OTS $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE OF THE PERUVIAN COAST FROM LIMA TO TALARA, by John W. Gabelman and Cesar Rangel Z. July 59, 16p 3refs Prepared in cooperation with Junta de Control de Energia Atomica.

RME-4543 OTS $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
THE SAYAPULLO MINE AREA, CAJAMARCA DEPARTMENT, PERU, by John W. Gabelman. Jul 59, 17p 3refs Prepared in cooperation with Instituto de Investigaciones Geologicas.

Physics of the Atmosphere

NYO-9677 OTS $7.60

Del Electronics Corp., Mount Vernon, N. Y.
STRATOSPHERIC MONITORING PROGRAM. Semiannual progress rept., Jul 62-Jan 63, by M. Lippmann.
15 Mar 63, 71p 6refs
Contract AT(30-1)2363

NASA N63-19367 OTS $2.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
PROPERTIES OF THE F_2 REGION OF THE IONOSPHERE, by W. T. Roberts. 15 Apr 63, 22p 5refs
MTP-AERO-63-23; NASA TM X-50260

NASA N63-18375 OTS $2.60

Southwest Center for Advanced Studies, Dallas, Tex.
DYNAMIC DIFFUSION PROCESSES IN THE EXOSPHERE, by W. B. Hanson. 26 Apr 63, 22p 12refs
Grant NsG-269-62
NASA CR-50417

Presented at the NATO Advanced Study Institute on Electron Density Profiles in the Ionosphere and Exosphere.

ENGINEERING

IS-562 OTS $1.50

Ames Lab., Iowa State U. of Science and Tech.
DESIGN, CONSTRUCTION, AND PERFORMANCE OF TWO COMPACT AIR COOLED SODIUM HEAT EXCHANGERS, by William F. Brown, Ray W. Fisher, and Henry M. Black. May 63, 59p 10refs
Contract W7405-eng-82

ANL-6738 OTS $1.00

Argonne National Lab., Ill.
DEVELOPMENT OF AN ELECTRICAL RESISTIVITY PROBE FOR VOID-FRACTION MEASUREMENTS IN AIR-WATER FLOW, by George P. Nassos. Jun 63, 38p 14refs
Contract W31-109-eng-38

ANL-6754 OTS $2.50

Argonne National Lab., Ill.
AN EXPERIMENTAL INVESTIGATION OF TWO-PHASE, TWO-COMPONENT FLOW IN A HORIZONTAL, CONVERGING-DIVERGING NOZZLE, by Joseph A. Vogrin, Jr. Jul 63, 131p 27refs
Contract W31-109-eng-38

PNE-217F OTS $2.50

Boeing Co., Seattle, Wash.
MASS DISTRIBUTION AND THROWOUT STUDIES. Final rept. on Proj. SEDAN, by R. H. Carlson and W. A. Roberts. May 63, 144p 18refs

BNL-6796 OTS $2.60

Brookhaven National Lab., Upton, N. Y.
FUNDAMENTALS OF VACUUM TECHNOLOGY, by C. L. Gould. 15 Feb 63, 28p
Contract AT(30-2)GEN-16.

PNE-104F OTS $0.50

Lawrence Radiation Lab., U. of California, Livermore.
CLOSE-IN SHOCK STUDIES. Final rept. by David B. Lombard and Dean V. Power. 22 Mar 62, 27p 6refs
Contract W7405-eng-48.

PNE-300 OTS $0.50

Lawrence Radiation Lab., U. of California, Livermore.
SCOPE OF CHEMICAL EXPLOSIVE CRATERING EXPERIMENT. Preliminary rept. on Proj. PRE-BUGGY by E. Graves, W. R. Wray and R. B. Pierce.
15 May 63, 50p

LAMS-2934 OTS $1.25

Los Alamos Scientific Lab., N. Mex.
TEMPERATURE-FLOW STABILITY EXPERIMENTS, by F. A. Guevara, B. B. McInteer, and R. M. Potter.
10 Jul 63, 52p
Contract W7405-eng-36

NASA N63-19263 OTS $2.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
A RADIANT HEAT SOURCE IN A SIMULATED ALTITUDE ENVIRONMENT, by F. Uptagrafft, H. M. King, and W. N. Clotfelter. 19 Dec 62, 24p 2refs
MTP-P&VE-M-62-15; NASA TM X-50221

PNE-230F OTS $1.25

Naval Radiological Defense Lab., San Francisco, Calif.
NAVAL AERIAL PHOTOGRAPHIC ANALYSIS. Rept. on Proj. SEDAN, by F. L. Vuillemot. Jan 63, 52p 5refs

SC-4911(RR) OTS $1.25

Sandia Corp., Albuquerque, N. Mex.
ARGON OPERATION OF THE 120-KW SANDIA ARC JET FACILITY, by W. B. Brooks and G. E. Reis.
May 63, 53p 12refs
Contract AT(29-1)789

SCR-312 OTS $1.60

Sandia Corp., Albuquerque, N. Mex.
BASIC PROBLEMS IN DESCRIBING, GAGING, AND ACCEPTING PARTS, by B. E. Barker Feb 63, 11p
Contract AT(29-1)789

SCR-679 OTS $0.75

Sandia Corp., Albuquerque, N. Mex.
FREE-FIELD GROUND MOTION PRODUCED BY EXPLOSIONS, by William R. Perret. Jul 63, 34p
Contract AT(29-1)789

SCR-617 OTS $0.50

Sandia Corp., Albuquerque, N. Mex.
THE PHANTOM GAGE (COMBINED PART AND GAGE SPECIFICATIONS), by E. S. Roth. Jun 63, 5p
Contract AT(29-1)789

PNE-202F OTS $0.75

Sandia Corp., Albuquerque, N. Mex.
SEDAN LONG RANGE BLAST PROPAGATION. Final rept. on Proj. PLOWSHARE, by Jack W. Reed and Hugh W. Church. Jun 63, 35p 12refs

PB 181 510 OTS $0.75

Stevens Inst. of Tech., Hoboken, N. J.
SUMMARY OF INVESTIGATION OF MIDSHIP BENDING MOMENTS EXPERIENCED BY MODELS IN EXTREME REGULAR WAVES. Final rept. on Model in Extreme Waves, Proj. SR-157, by John F. Dalzell.
18 Dec 63, 23p 4refs
Contract NObs-88509
SSC-157

DESCRIPTORS: *Ship hulls, *Hulls (Marine), Deformation, Moments, Ship models, Cargo ships, Tankers, Destroyers, *Water waves, Statistical analysis.

This report summarizes experimental research to investigate the possibility of a physical upper limit on midship bending moments being reached in regular waves of height significantly less than the theoretical upper limit of stability for progressive waves ($h/\lambda = 1/7$). The experiments included variation of ship type, of distribution of loading and of freeboard as model parameters. The ship types investigated were a modern cargo vessel, a large tanker, and a modern destroyer. Each model was tested at various speeds in

regular head and following waves of several different leagths and of a wide range of heights. No significant upper limit of bending moment was found. However, the study establishes more firmly the grossly linear dependence of midship bending moment on wave height, even for extreme wave heights which may be encountered in service. These findings strengthened the case for determining design wave bending moments on the basis of statistical analyses of ocean waves and/or resulting bending moments.

Aeronautical Engineering

PB 181 553 OTS $4.00

Airborne Instruments Lab., Deer Park, N. Y.
AIRPORT CAPACITY. A HANDBOOK FOR ANALYZING AIRPORT DESIGNS TO DETERMINE PRACTICAL MOVEMENT RATES AND AIRCRAFT OPERATING COSTS. Rept. on Contract FAA/BRD-136. June 63, 279p. Proj. 412-7-1R.

DESCRIPTORS: *Airports, Design, Air traffic control, Terminal flight facilities, *Runways, *Air traffic, Take-off, Landings, Taxiing, Scheduling, *Handbooks.

This handbook is designed to permit the user to determine: (1) capacity of a given airport; (2) relationship of the capacity of a given airport to the traffic demand; and (3) effects of the capacity and demand on airport improvements or changes and vice versa.

PB 163 679 OTS $19.75

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INSTALLATION OF AN AUTOMATIC CONTROL SYSTEM IN A T-33 AIRPLANE FOR VARIABLE STABILITY FLIGHT RESEARCH. PART 1: PRELIMINARY INVESTIGATION AND DESIGN STUDIES. Rept. on Flight Control Technical Requirements, ed. by J. N. Ball. Jul 56, 332p 10refs
Contract AF 33(616)2578
WADC Technical rept. 55-156, Part 1; AD-97 136

DESCRIPTORS: *Jet training planes, *Flight control systems, Atuomatic, Control systems, *Servomechanisms, Design, Simulation, Stability.

The preliminary design phase was completed of a project under which a T-33 will be equipped as a variable stability airplane for a program of flight research on airplane handling characteristics. Irreversible hydraulic servos will be used to operate the control surfaces so as to provide artificial stability about all three axes. Variable stick force characteristics will be provided by an artificial feel system. Simulation of other airplanes will be possible with this highly versatile system. Special equipment is also being included for research on cockpit controls. A satisfactory preliminary design study has been completed for the control system. Methods have been developed for handling the major problems of detailed design. (Author)

PB 163 680 OTS $9.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INSTALLATION OF AN AUTOMATIC CONTROL SYSTEM IN A T-33 AIRPLANE FOR VARIABLE STABILITY FLIGHT RESEARCH. PART 2. DETAIL DESIGN, FABRICATION AND INSTALLATION. Rept. for Apr 55-Jun 56, by J. N. Ball. Dec 56, 106p 9refs
Contract AF 33(616)2578
Rept. no. TB-936-F-2; WADC Technical rept. 55-156, Part 2; AD-118 104

DESCRIPTORS: Jet training planes, *Flight control systems, Control systems, Automatic, *Servomechanisms, Simulation, Stability, Design, Construction, Stability.

(See also PB 163 679)

PB 163 678 Available on loan from OTS

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PRELIMINARY INVESTIGATION OF A VARIABLE STABILITY INSTALLATION FOR A T-33 AIRPLANE, by J. N. Ball, C. L. Muzzey, W. J. Thayer, W. Close, and C. R. Notess. Apr 55, 302p 2refs
Contract AF 33(616)2576
FRM no. 219; WADC Technical rept. 55-156; AD-85 043

DESCRIPTORS: *Airplanes, *Jet training planes, *Control systems, *Hydraulic servomechanisms, Control surfaces, Stability, *Flight testing, Aircraft equipment, *Research planes, Design.

The preliminary design was completed for a project under which a T-33 will be equipped as a variable stability airplane for a program of flight research on airplane handling characteristics. Irreversible hydraulic servos will be used to operate the control surfaces so as to provide artificial stability about all three axes. Variable stick force characteristics will be provided by an artificial feel system. Simulation of other airplanes will be possible with this highly versatile system. Special equipment is also being included for research on cockpit controls. A satisfactory preliminary design study has been completed for the control system. Methods have been developed for handling the major problems of detailed design.

PB 163 753 OTS $4.60

[Flight Research Center, National Aeronautics and Space Administration] Edwards, Calif.
FLIGHT MEASUREMENTS OF THE DYNAMIC LONGITUDINAL STABILITY AND FREQUENCY-RESPONSE CHARACTERISTICS OF THE XF-92A DELTA-WING AIRPLANE, by Euclid C. Holleman and William C. Triplett. 13 Jan 55, declassified 31 Oct 58. 46p 7refs
Research memo. RM H54J26a

DESCRIPTORS: *Aircraft, *Jet fighters, Aerodyanmic characteristics, *Aerodynamic configurations, *Wings, *Delta wings, Aerodynamic control surfaces, Stability (Longitudinal), Oscillation, Damping, Pitch (Motion), Acceleration.

Results of dynamic longitudinal flight tests conducted with the XF-92A delta-wing airplane over a Mach number range of 0.42 to 0.94 at an altitude of about 30,000 feet are presented. The data were analyzed by measuring the airplane oscillatory characteristics, by matching the airplane system with an analogue computer, and by determining the frequency-response characteristics of the airplane. Wherever possible, stability derivatives were computed and are presented as a function of Mach number. (Author)

PB 163 756 OTS $3.60

[Flight Research Center, National Aeronautics and Space Administration]. Edwards, Calif.
FLIGHT MEASUREMENTS OF THE LATERAL RESPONSE CHARACTERISTICS OF THE CONVAIR XF-92A DELTA-WING AIRPLANE, by Euclid C. Holleman. 5 Aug 55, declassified 16 May 58. 37p 14refs
Research memo RM-H55E26

DESCRIPTORS: *Aircraft, *Jet fighters, Aerodynamic characteristics, *Aerodynamic configurations, *Wings, *Delta wings, Aerodynamic control surfaces, *Aerial rudders, Stability (Lateral), Roll, Damping.

Rudder pulse maneuvers were performed with the XF-92A 60° delta-wing airplane at 30,000 feet over a Mach number range of 0.52 to 0.92. Tests were conducted with and without a wing fence. Representative data were analyzed to give airplane stability derivatives and frequency responses. (Author)

PB 163 755 OTS $5.60

[Flight Research Center, National Aeronautics and Space Administration] Edwards, Calif.
LATERAL STABILITY AND CONTROL CHARACTERISTICS OF THE CONVAIR XF-92A DELTA-WING AIRPLANE AS MEASURED IN FLIGHT, by Thomas R. Sisk and Duane O. Muhleman. 26 May 55, declassified 20 Jan 58. 55p 13refs
Research memo RM-H55A17

DESCRIPTORS: *Aircraft, *Jet fighters, Aerodynamic characteristics, *Aerodynamic configurations, *Wings, *Delta wings, Aerodynamic control surfaces, *Ailerons, *Aerial rudders, Stability (Lateral), Roll, Damping, *Flight control systems.

The lateral stability and control characteristics of the Convair XF-92A delta-wing airplane are determined from sideslips, aileron rolls, and rudder pulses. A limited amount of data with wing fences installed at 60 percent of the wing semispan is presented for comparison with the basic airplane configuration. (Author)

PB 163 754 OTS $5.60

[Flight Research Center, National Aeronautics and Space Administration] Edwards, Calif.
LONGITUDINAL STABILITY CHARACTERISTICS IN MANEUVERING FLIGHT OF THE CONVAIR XF-92A DELTA-WING AIRPLANE INCLUDING THE EFFECTS OF WING FENCES, by Thomas R. Sisk and Duane O. Muhleman. 13 Jan 55, declassified 31 Oct 58. 53p 7refs
Research memo RM-H54J27

DESCRIPTORS: *Aircraft, *Jet fighters, Aerodynamic characteristics, *Aerodynamic configurations, *Wings, *Delta wings, Aerodynamic control surfaces, Stability (Longitudinal), Pitch (Motion), *Flight control systems.

The longitudinal maneuvering stability characteristics are evaluated on the Convair XF-92A delta-wing airplane in wind-up turns over the Mach number range from 0.70 to 0.95 at altitudes between 22,000 and 39,000 feet. A longitudinal stability reduction evidenced as a pitch-up encountered over the Mach number range tested is evaluated along with the airplane behavior in the region of reduced stability. Two wing fence configurations are evaluated and compared with the basic airplane configuration characteristics. (Author)

PB 163 757 OTS $10.50

[Flight Research Center, National Aeronautics and Space Administration] Edwards, Calif.
WING PRESSURE DISTRIBUTIONS OVER THE LIFT RANGE OF THE CONVAIR XF-92A DELTA-WING AIRPLANE AT SUBSONIC AND TRANSONIC SPEEDS, by Earl R. Keener and Gareth H. Jordan. 30 Nov 55, declassified 17 Jul 58. 135p 13refs
Research memo RM-H55G07

DESCRIPTORS: *Aircraft, *Jet fighters, Aerodynamic characteristics, *Aerodynamic configurations, *Wings, Delta wings, Subsonic characteristics, Transonic characteristics, Aerodynamic control surfaces, *Elevons, Pressure, Load distribution, Lift.

Chordwise and spanwise pressure distributions are presented for the left wing of the Convair XF-92A delta-wing airplane at Mach numbers from 0.30 to 0.93. Reynolds number based on the mean aerodynamic chord of the wing varied between 22×10^6 and 49×10^6. The data cover the lift range from level flight to near-maximum lift. Effects of wing-section stall upon the elevon-section loads are included. (Author)

PB 163 752 OTS $5.60

[Flight Research Center, National Aeronautics and Space Administration.] Edwards, Calif.
WING PRESSURE DISTRIBUTIONS AT LOW LIFT FOR THE XF-92A DELTA-WING AIRPLANE AT TRANSONIC SPEEDS, by Earl R. Keener. 20 Oct 54, declassified 17 Sep 58. 55p 3refs
Research memo. RM-H54H06

DESCRIPTORS: *Aircraft, *Jet fighters, Aerodynamic characteristics, *Aerodynamic configurations, *Wings, *Delta wings, Transonic characteristics, Lift, Pressure, Load distribution, Pitch (Motion), Aerodynamic control surfaces, Elevons.

Wing pressure distributions from dives at transonic speeds for the Convair XF-92A delta-wing airplane are presented. The data were obtained from five chordwise rows of orifices on the left wing throughout the Mach number range of 0.74 to 1.01 at an airplane normal-force coefficient of about 0.09, for which the left elevon deflection was about 2° up. (Author)

NASA N63-19942 OTS $6.60

Republic Aviation Corp., Farmingdale, N. Y.
ANALYSIS OF COMPLEX REDUNDANT STRUCTURES BY THE FLEXIBILITY METHOD, by Claus J. Meissner
12 Dec 62, 62p 6refs
Contract NAS8-2646
RAC-406-3; ARD-817-453; NASA CR-50755

PB 163 685 OTS $12.00

Stanford Research Inst., Menlo Park, Calif.
RADIATION PATTERNS OF RECOMMENDED ANTENNA INSTALLATIONS FOR ARMY ROTARY-AND FIXED-WING AIRCRAFT. Final rept. by John B. Chown
Sep 57, 166p 12refs
Contract DA 36-039-sc-64435
SRI Proj. 1125; AD-157 458.

DESCRIPTORS: *Military aircraft, *Liaison planes, *Utility planes, *Helicopters, *Airplane antennas, *Antenna radiation patterns, *Communication systems, *Radio navigation, Radio homing, Radio ranges, Frequency modulation, Very high frequency, Ultra high frequency.

The report presents the specific locations and antenna types selected, and the scale-model radiation patterns obtained from the recommended antenna installations on the L-19, L-20, U1-A, H-13, H-19, H-21, H-34, H-37, and H-40 aircraft. The following communication and navigation antenna installations for the aircraft named are covered: (1) LF navigation and reception (190 - 1750 kc), (2) FM communication (24 - 52 mc), (3) FM homing (24 - 52 mc), (4) marker beacon (75 mc), (5) VHF omnirange (VOR) (108 - 118 mc), (6) VHF communication (118 - 148 mc), and (7) UHF communication (225 - 400 mc). (Author)

PB 163 684 OTS $11.50

Stanford Research Inst., Menlo Park, Calif.
STUDY OF HELICOPTER ROTOR MODULATION OF THE V-H-F OMNIRANGE SIGNAL. Final rept. 1 Jul 53-31 Dec 54, by R. B. Battelle. Mar 55, 153p 19refs
Contract DA 36-039-sc-52668
SRI Proj. 869; AD-63 914

DESCRIPTORS: *Helicopter rotors, *Airplane antennas, *Antenna radiation patterns, *Radio navigation, Radio ranges, Very high frequency, Radio interference

The report covers the techniques of rotor modulation measurement, the effects of antenna design and placement, and the characteristics of the VOR system that determine its susceptibility to rotor modulation. The extent of the VOR bearing disturbance due to rotor modulation is shown to be a function of the frequency and relative amplitude of the harmonics of the modulation waveform that fall nearest to 30 and 60 cps, and of the VOR indicator that is used. Under the least favorable rotor speed conditions (blade passage rate nearly equal to a submultiple of 30 cps), a 3% harmonic component at nearly 30 cps will produce a bearing deviation of ±6 deg. Of the two helicopters considered in detail, the third harmonic of the blade passage rate of the H-19 falls at or very near 30 cps, whereas the modulation harmonics of the H-21 normally miss that frequency by a wide margin. The standard ram's-horn antenna installation on top of the helicopter fuselage generally results in objectionable modulation.

Chemical Engineering

ANL-6648 OTS $3.00

Argonne National Lab., Ill.
CHEMICAL ENGINEERING DIVISION SUMMARY REPORT, OCTOBER-DECEMBER, 1962. May 63, 241p 66refs
Contract W31-109-eng-38

ORNL-TM-449 OTS $8.60

Oak Ridge National Lab., Tenn.
CHEMICAL TECHNOLOGY DIVISION. CHEMICAL DEVELOPMENT SECTION C, by K. B. Brown.
Progress rept. Jul-Dec 62.22 Apr 63, 93p 38refs
Contract W7405-eng-26

PB 181 554 OTS $2.75

Office of Saline Water, Dept. of the Interior, Washington, D. C.
BIBLIOGRAPHY OF MEMBRANE TECHNOLOGY PERTAINING TO SALINE WATER DESALINATION, comp. by George F. Mangan, Jr., James M. Shackelford, and Karel A. Kase. Oct 63, 121p 1408refs
Research and development progress rept. no. 83.

DESCRIPTORS: *Sea water, *Desalination, *Membranes, *Ion exchange, *Bibliographies.

IDO-14611 OTS $1.00

Phillips Petroleum Co., Idaho Falls.
CHEMICAL PROCESSING TECHNOLOGY. Quarterly progress rept., Oct-Dec 62. 7 Jun 63, 40p 17refs
Contract AT(10-1)205

DP-839 OTS $0.50

Savannah River Lab., Aiken, S. C.
PROCESSING OF POWER REACTOR FUELS. Quarterly progress rept. no. 22, 1 Jan-1 Apr 63, comp. by A. A. Kisbaugh. 10p 3refs
Contract AT(07-2)1

DP-826 OTS $0.50

Savannah River Lab., Aiken, S. C.
RECOVERY OF URANIUM FROM ZIRCONIUM-URANIUM ALLOY, by Hugh E. Henry. May 63, 23p 16refs
Contract AT(07-2)1

DP-808 OTS $0.50

Savannah River Lab., Aiken, S. C.
URANIUM(IV) NITRATE AS A REDUCING AGENT FOR PLUTONIUM(IV) IN THE PUREX PROGRESS, by Carl S. Schlea, Myron R. Caverly, H. E. Henry, and W. J. Jenkins. Apr 63, 20p 15refs
Contract AT(07-2)1

Civil Engineering

SC-4781(RR) OTS $2.00

Sandia Corp., Albuquerque, N. Mex.
SLIDE-DAM CONSTRUCTION EMPLOYING NUCLEAR EXPLOSIVES, by G. A. Young. May 63, 79p 6refs
Contract AT(29-1)789

Y-1418 OTS $2.50

Union Carbide Nuclear Co., Oak Ridge, Tenn.
A COMPARISON OF FLAT AND GABLED ROOF BUILDINGS SUPPORTED BY RIGID STEEL FRAMES, by C. J. Williams. 5 Mar 63, 147p 6refs
Contract W7405-eng-26

Electrical and Electronic Engineering

PB 163 681 OTS $3.60

Antenna Lab., Ohio State U. Research Foundation, Columbus, Ohio.
AN EVALUATION OF SOME ASPECTS OF STATIC MODEL RADAR ECHO MEASUREMENTS. Rept. on Measurements of Reflection Characteristics, by M. H. Cohen. 30 Jun 54, declassified 15 Mar 62, 36p 12refs
Contract AF 18(600)19
Engineering rept. 475-17; AD-43 374

DESCRIPTORS: *Radar reflections, Measurement, *Radar targets, *Airplane models, Cylindrical bodies, Polarization, Errors.

An experiment is described to test the effect of making static radar echo measurements at ranges much less than those given by the standard $4D^2/\lambda$ criterion for minimum range. This information is of interest because both static and dynamic measurements are often made at shorter ranges. Experimental errors and the self-consistency of static measurements are discussed. The major conclusions are as follows: There is no over-all range or polarization sensitivity in echo area medians for an aircraft whose dimensions are much greater than a wavelength for "round-trip" phase deviations for 0 to 6.6 π radians. However, occasional individual aspects do show significant effects. Modeling errors (for very large models) may be as great or greater than any range or polarization differences. (Author)

PB 163 683 OTS $9.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
AN INVESTIGATION OF PULSED RADAR SYSTEMS FOR MODEL MEASUREMENTS. Rept. on Measurements of Reflection Characteristics, by D. R. Rhodes. 1 Dec 53, 118p 41refs
Contract AF 18(600)19
Engineering rept. 475-6; AD-22 559

DESCRIPTORS: *Radar pulses, Radar antennas, Coupled antennas, Radar echo areas, *Radar targets, Spheres, Ogives, Cylindrical bodies, Models (Simulations), Radar reflections, Scattering, *Dielectrics.

Methods for measuring relatively small radar cross sections were investigated by the use of a conventional pulsed radar transmitter and receiver. The major effort was directed toward (1) reducing all extraneous received signals to the smallest possible level relative to the target echo and (2) developing a structure to support the target without altering the radar cross section. The characteristics of the antenna system are investigated, and methods are suggested for reducing the power coupled directly between antennas to below background return levels. Measured patterns of radar cross sections of a sphere, prolate spheroid, and ogive compared favorably with theoretical patterns based on geometrical optics. Styrofoam columns and a steel frame with strings were investigated as target supports. The latter appeared to be superior for measuring small echoes. A theoretical investigation was made of scattering by dielectric columns. An integral equation for the total dielectric was solved for the case of an infinite cylinder of arbitrary cross section. Numerical computations are included for the echo width of a circular cylinder one wave length in diameter. An approximate formula was derived which relates the echo width of an infinite cylinder to the echo area of a cylindrical column. (DDC abstract)

PB 163 682 OTS $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
ON MINIMUM RANGE FOR RADIATION PATTERNS. Rept. on Measurements of Reflection Characteristics, by D. R. Rhodes. 1 Jun 54, 11p 5refs
Contract AF 18(600)19
Engineering rept. 475-10; AD-35 516

DESCRIPTORS: *Radar antennas, *Parabolic antennas, *Horn antennas, *Antenna radiation patterns, Ranges (Distance), Radar reflections, Scattering.

It is shown that the $2D^2/\lambda$ antenna criterion ensures a phase variation less that $\pi/8$ and an amplitude variation less than 10% over D when using a paraboloidal or optimum horn antenna for illumination, providing its aperture dimensions do not exceed D. The pattern of a uniform line antenna illuminated by such a paraboloid is shown to be essentially the same as its conventional pattern (point source illumination). It is also shown that the appropriate criterion for back scattering patterns is $4D^2/\lambda$. (Author)

TID-18387 OTS $1.60

Argonne National Lab., Ill.
NON-DESTRUCTIVE MEASUREMENTS FOR DETERMINING THE ADEQUACY OF A DIELECTRIC, by Herbert F. Vogel. 7 Jan 63, 15p
Contract W31-109-eng-38

AD-265 623 OTS $8.60

Burndy Corp., Norwalk, Conn.
TERMINAL: LUG AND SPLICE, WIRE, HIGH TEMPERATURE. Phase V rept. by G. E. Hood and A. E. Nash. 30 Sep 60, 94p
Contract AF 33(600)35489, Subcontract to North American Aviation, Inc.

DESCRIPTORS: *Electric terminals, Electric connectors, *Fastenings, Electric wire, Electric insulation, *Heat-resistant materials, Manufacturing methods.

Contents:
Prototype production assembly description
An outline of terminal and splice component design
List of all materials and processes used in each part of the subcomponent
Description of the manufacturing processes used in each part of the subcomponent
Assembly and inspection procedure for each component and subcomponent

PB 163 688 OTS $3.60

General Electric Co., Pittsfield, Mass.
INVESTIGATION AND RESEARCH PERTAINING TO THE DEVELOPMENT AND DESIGN OF TANTALUM ELECTROLYTIC CAPACITORS. Quarterly rept. no. 1, 1 Nov 51-30 Jan 52, by A. L. Jenny and A. F. Torrisi. 30 Jan 52, 31p
Contract DA 36-039-sc-15423
ATI-165 833

DESCRIPTORS: *Capacitors, *Electrolytic capacitors, *Tantalum capacitors, Tantalum compounds, Oxides, *Foils, Measurement, Barium compounds, Stearates, Spectroscopy, X-ray diffraction analysis, Electron microscopy, *Electrodes, *Zirconium, Oxidation.

Usually the thickness of tantalum oxide in electrolytic capacitors, expressed in Angstrom units per volt, has been given without specifying formation conditions. Since it has been established that the oxide thickness and therefore the capacitance per unit area does vary with formation conditions, the oxide parameter of thickness has been specifically defined in terms of the following: (a) temperature of forming electrolyte (b) foil preparation prior to formation (c) forming electrolyte (d) formation voltage. While etched foil units usually have low temperature properties inferior to plain foil units, the characteristics can be improved and made acceptable by proper adjustment of fill electrolyte resistivity. Preliminary work on the evaluation of zirconium as an electrode metal for electrolytic capacitors is presented.

PB 163 689 OTS $3.60

General Electric Co., Pittsfield, Mass.
INVESTIGATION AND RESEARCH PERTAINING TO THE DEVELOPMENT AND DESIGN OF TANTALUM ELECTROLYTIC CAPACITORS. Quarterly rept. no. 2, 1 Feb-30 Apr 52, by F. W. Grahame, A. L. Jenny, and A. F. Torrisi. 30 Apr 52, 31p.
Contract DA 36-039-sc-15423
ATI-159 690

DESCRIPTORS: *Capacitors, *Electrolytic capacitors, *Tantalum capacitors, Tantalum compounds, Oxides, Electron diffraction analysis, *Foils, Storage, *Electrodes, *Zirconium, *Welding, Electrical properties.

Further studies have been made on the perameters of tantalum and tantalum oxide and their effect on the behavior of tantalytic capacitors. Data is reported on electron diffraction studies of tantalum foil before and after anodic oxidation. The presence of an air-formed oxide film is postulated. Test results obtained in connection with the evaluation of tantalum foil made by the aluminum tantalate process are reported in detail. Life test data is included involving the evaluation of tantalum foil fabricated from finer mesh tantalum powder. Plain and etched foil units are evaluated in polar and nonpolar design with high temperature forming technique. The effects of various storage conditions of etched foil, prior to formation, on low temperature characteristics and 85°C - 150 volt d-c life have been obtained. The conductivity of various electrolyte-saturated spacer materials indicating the effects of resistivity, structure, viscosity and surface tension is reported. Life tests and low temperature tests on 300 volt d-c tantalytics are described for various roll type capacitors and additional Laboratory test cells. (See also PB 163 688)

PB 163 690 OTS $4.60

General Electric Co., Pittsfield, Mass.
INVESTIGATION AND RESEARCH PERTAINING TO THE DEVELOPMENT AND DESIGN OF TANTALUM ELECTROLYTIC CAPACITORS. Quarterly rept. no. 3, by F. W. Grahame, A. L. Jenny, and A. F. Torrisi. [1952] 44p
Contract DA 36-039-sc-15423
ATI-186 859

DESCRIPTORS: *Capacitors, *Electrolytic capacitors, *Tantalum capacitors, Tantalum compounds, Oxides, *Foils, *Electrical discharges, Storage, Electrolytes, *Welds, Electrical properties, Encapsulation.

Scintillation voltage studies were made covering the effect of foil precleaning and current density. Several electrolytes were studied. Data on the effect of foil storage conditions on capacitor life at 150 volts d-c, 85°C is reported. A group of potential low temperature, low voltage electrolytes were studied and their properties alone and in capacitors are given. The effect of lead welding technique on the performance of 300 volts d-c rated tantalytics was studied at some length principally in glass test cells. Data is presented which indicates that in the absence of a separator, electrolytes having quite high resistivities at -55°C may perform satisfactorily. Laboratory built capacitors of special design have shown considerable promise at 125°C, 150 volts d-c, while still preserving good characteristics at -55°C. A series constructed 9 Mfd, 450 volt tantalytic capacitor has shown excellent performance at 85°C, 450 volts d-c for over 2000 hours to date. An experimental capacitor similar in external appearance to present designs has been operated at 325 volts d-c, 65°C for 700 hours with good results to date. (See also PB 163 689)

PB 163 691 OTS $2.60

General Electric Co., Hudson Falls, N. Y.
INVESTIGATION AND RESEARCH PERTAINING TO THE DEVELOPMENT AND DESIGN OF TANTALUM ELECTROLYTIC CAPACITORS. Quarterly rept. no. 4, 1 Sep-30 Nov 52, by A. L. Jenny and A. F. Torrisi. [1952] 26p
Contract DA 36-039-sc-15423

DESCRIPTORS: *Capacitors, *Electrolytic capacitors, *Tantalum capacitors, Tantalum compounds, Oxides, Material forming, Thermal stresses, Storage, Electrolytes, *Welds, Electrical properties, *Electrodes, *Zirconium.

The quality of tantalum electrolytic capacitors is a function of formation temperature as well as formation voltage. A fundamental relationship is expressed relating various formation temperatures and formation voltages for constant capacitance per unit area of foil. A theoretical approach is made in the direction of predicting life at various operating temperatures, based on life test time required to cause a 10% drop in capacitance. A new source of 0.0005" thick tantalum foil has been approved after a product evaluation. A pilot plant for batch-wise etching of 0.0005" tantalum is described. The effect of replacing oxidized tantalum leads with solderable leads is described. The effect of storage conditions of etched foil prior to formation is described after practically completed life test. (See also PB 163 690)

PB 163 692 OTS $2.60

General Electric Co., Hudson Falls, N. Y.
INVESTIGATION AND RESEARCH PERTAINING TO THE DEVELOPMENT AND DESIGN OF TANTALUM ELECTROLYTIC CAPACITORS. Quarterly rept. no. 5, 1 Dec 52-28 Feb 53, by A. L. Jenny and A. F. Torrisi. [1953] 29p
Contract DA 36-039-sc-15423
AD-11 767

DESCRIPTORS: *Capacitors, *Electrolytic capacitors, *Tantalum capacitors, Tantalum compounds, Oxides, *Foils, Heat treatment, Material forming, *Electrodes, *Zirconium, Electrolytes, Electrical properties, Impregnation.

The life of capacitors was prolonged when the electrolyte used was an oxidized Ta foil which had been heat treated and reoxidized. Accelerated life testing at 150 v dc and 150°C enabled the determination of the relative life with various fill electrolytes in 4 to 7 days compared to months under service conditions. A D50P33D-impregnated capacitor was temperature-responsive and may be useful as a temperature-control element. Maximum etch ratios and methods were established for control of the etched-foil capacitance formed to the required voltage or its equivalent. Zr was not as adaptable to cleaning and forming procedures as Ta. Capacity per sq in. of Zr over a wide voltage range was 65% that of Ta. A 300-v dc series unit was successfully operated at rated voltage and 85°C for 7000 hr. The power factor was decreased and capacitance increased at -55°C by choice of spacer material. Single-cell 300-v tantalytics on rated voltage at 65°C lost 10% of their initial capacitance in about 100 hr. A test unit subjected to 105 v at 125°C showed little tendency to lose capacitance even after 1200 hr. (DDC abstract) (See also PB 163 691)

PB 163 687 OTS $12.00

Hoffman Electronics Corp., El Monte, Calif.
TEMPERATURE INSENSITIVE TRANSISTOR. Final rept., 15 May 61-15 May 62, by John Spanos and R. Epple. [1962] 167p 13refs
Contract DA 36-039-sc-87276

DESCRIPTORS: *Semiconductor devices, *Transistors, Temperature, Sensitivity, Electrical properties, Theory, Design, Equations.

A new gain expression for transistors is derived and experimentally confirmed. The gain of transistors can be held relatively insensitive to temperature over a wide range of current by controlled leakage paths. Gain degradation is caused by the leakage paths, and this is particularly critical at low levels of operation. The new gain equation predicts that, with improved surface control. much higher gains are possible than have been realized by present technology. The surface proves to be the limiting factor for both high gain and gain temperature variation control. (Author)
(See also AD-267 493)

NASA N63-18866 OTS $7.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
PHASE ATTENUATION CHARACTERISTICS OF A VOLTAGE CONTROLLED ATTENUATOR. Scientific rept. by R. W. Vogt. 1 Jul 63, 79p 19refs
Grant NsG-134-61
Scientific rept. no. 188(E); NASA CR-50693

PB 163 779 Available on loan from OTS

Jack and Heintz, Inc., Cleveland, Ohio.
MODEL 50188-000 CURRENT TRANSFORMER FOR NORTH AMERICAN AVIATION. Revised Final rept., Phase V, by D. W. Maurus and J. R. Cecil. 26 Feb 60, 118p
Contract AF 33(600)35489, Subcontract to North American Aviation, Inc.
AD-240 562

DESCRIPTORS: *Aircraft equipment, *Transformers, Design, Construction, Magnetic cores, Electric wire, Electric insulation, Embedding substances, Molding, Heat-resistant materials.

Design and fabrication manual.

UCRL-10754 OTS $1.25

Lawrence Radiation Lab., U. of California, Berkeley.
A PULSE MODULATOR THAT CAN BE USED AS AN AMPLIFIER, A MULTIPLIER, OR A DIVIDER. Master's thesis, by Jerome A. Rosenthal. 2 Apr 63, 56p 9refs
Contract W7405-eng-48

PB 163 778 OTS $2.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
RESULTS OF GROUND-CLUTTER-ELIMINATION EXPERIMENTS. Technical rept. no. 8, by R. H. Baker and H. M. Elliott. 30 June 52, declassified 15 Dec 59. 23p
Contracts AF 19(122)458 and DA 36-039-sc-5450
AD-969

DESCRIPTORS: *Radar targets, *Target discrimination, *Antenna radiation patterns, Radar images, Radar tracking, Tests, Radar antennas, *Radar signals.

The results of experiments made to reject ground-clutter returns from a SDV radar picture by making use of the repeatability of ground clutter are described. The method used, along with some of the physical parameters affecting the final results, are discussed. (Author)

TID-17523 OTS $2.60

Microwave Lab., Stanford U., Calif.
LIGHT OUTPUT OBSERVATIONS ON LOW PRESSURE MERCURY VAPOR DISCHARGES, by F. W. Crawford and H. R. Pagels. Oct 62, 26p
Contract AT(04-3)326
ML-962

SB-516 OTS $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
PAPER CAPACITORS. Jul 63, 9p 56refs
OTS Selective Bibliography SB-516

DESCRIPTORS: *Capacitors, *Paper capacitors, Paper, Manufacturing methods, Tests, Radiation effects, *Bibliographies.

Lists 56 references to foreign and domestic research on paper capacitors added to the OTS collection up to July 1963. Covers research on metallized paper capacitors, paper-mylar capacitors, vibration tests, lifetime tests, subminiature capacitors, capacitors for nuclear environments. (Author)

PB 161 894-3 OTS $2.50

Rome Air Development Center, Griffiss AFB, N. Y.
RADC RELIABILITY NOTEBOOK. Revision of Sections 4, 8, and 9 of PB 161 894-2 prepared by RCA Defense Electronic Products. Rev. 31 Jan 63, 118p
Contract AF 30(602)2192.

DESCRIPTORS: *Electronic equipment, Degradation, *Reliability (Electronics), Handbooks, *Mathematical prediction, Mathematical analysis, Graphic analysis, Circuits, Design, *Microminiaturization, *Transistors, *Molecular electronics, Interference.

Section 4 contains the basic mathematics of degradation analysis, Section 8 contains the degradation data, and Section 9 contains design guidelines applicable to degradation analysis. To be used with PB 161 894-2.

NASA N63-18457 OTS $6.60

Temco Electronics, Dallas, Tex.
ENVIRONMENTAL AND RFI TEST PROCEDURE 200 VOLT D. C. MISSILE POWER SUPPLY (INTERELECTRONICS CORP., MODEL 28BF3B-AN - SATURN). Engineering rept. by B. L. Nieswiadomy. 15 Jun 62, 60p 3refs
Contract NAS8-1691
Report No. 00.360; NASA CR-50392

AD-266 235 OTS $10.50

Westinghouse Electric Corp., Lima, Ohio.
TRANSFORMER-RECTIFIER, AIRCRAFT, HIGH TEMPERATURE SPECIFICATION NO. NA5-7256-1. PHASE V (LIMITED) REPORT. DESIGN AND FABRICATION MANUAL, by J. A. Jennings, Jr. 134p
Contract AF 33(600)35489, Subcontract to North American Aviation, Inc.

DESCRIPTORS: *Aircraft equipment, *Transformers, *Rectifiers, Instruction manuals, *Drafting, Electrical equipment, High temperature research, Direct current, Electric power production, Manufacturing methods, Materials, Tools, Design.

This report contains detailed information concerning the design and fabrication procedures used for production of 50-ampere, direct durrent transformer-rectifier units. Breadboard type transformer-rectifier units were completed, but no prototype high-temperature units were manufactured.

PB 181 537 OTS $0.50

Williams, Clyde and Co., Columbus, Ohio.
QUANTITY-PRODUCED METALLIZED-TEFLON CAPACITORS. A STEP TOWARD SUCCESSFUL EXTREME-SERVICE CIRCUITRY, by C. R. Smith and W. H. Bickley. [1963] 18p 10refs
Contract CC 4757

DESCRIPTORS: *Capacitors, *Plastic films, *Halocarbon plastics, *Fluorocarbons, Heat resistant plastics, Electrical properties, Manufacturing methods.

An evaluation of commercial applications

Ordnance, Missiles, and Satellite Vehicles

PB 163 694 OTS $5.60

Air Force Special Weapons Center, Kirtland AFB, N. Mex.
ELECTROEXPLOSIVE DEVICES. Technical note, by D. E. Thursby. Jan 59, 58p 12refs
AFSWC-TN-59-2; AD-208 702

DESCRIPTORS: *Fuzes (Ordnance), *Electric igniters, *Ammunition components, *Explosives initiators, *Aircraft, *Weapon systems, Charges (Explosive), *Hazards, Temperature, Electromagnetic waves, Radio signals, Impace shock, Safety.

After an introduction to electroexplosive devices, this paper discusses the hazards inherent in explosive devices, the magnitude of these hazards, and what steps can be taken to reduce them.

NASA N63-14028 OTS $1.00

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN EMERGENCY MIDCOURSE NAVIGATION PROCEDURE FOR A SPACE VEHICLE RETURNING FROM THE MOON, by C. Dewey Havill. Mar 63, 31p 3refs
Technical note D-1765.

NASA N63-19957 OTS $4.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
SATELLITE ORBITAL DATA NO. E-2. RESEARCH IN SPACE SCIENCE, by Fred L. Whipple. 15 Mar 63, 44p
Grant NsG-87-60.
Special rept. no. 119; NASA CR-50798.

NASA N63-18333 OTS $8.60

Boeing Co., Seattle, Wash.
STUDY ON LARGE LAUNCH VEHICLE UTILIZING SOLID PROPELLANTS. Progress review no. 2. 17 Nov 61, 91p
Contract NAS8-2438
Rept. no. D2-13029; NASA CR-50575

NASA N63-18494 OTS $13.00

General Electric Co., Schenectady, N. Y.
DESIGN CRITERIA FOR ZERO-LEAKAGE CONNECTORS FOR LAUNCH VEHICLES. VOLUME 4: DESIGN OF CONNECTORS. Final rept., Mar 62-Feb 63, by S. Levy. 15 Mar 63, 183p 3refs
Contract NAS8-4012
NASA CR-50560

NASA N63-19784 OTS $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A SIMPLIFIED STATISTICAL MODEL FOR MISSILE LAUNCHING- II, by Carleton B. Solloway. 1 Jun 63, 10p
Contract NAS7-100
Technical rept. no. 32-431, pt. 2; NASA CR-50764

NASA N62-16300 OTS $3.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
THREE-DIMENSIONAL TRAJECTORY ANALYSIS FOR ROUND-TRIP MISSIONS TO MARS, by Gerald Knip, Jr. and Charles L. Zola. Oct 62, 164p 7refs
Technical note D-1316.

NASA N63-12252 OTS $4.00

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
JUNO II SUMMARY PROJECT REPORT. VOLUME II. THE S-46 SATELLITE, by Arthur W. Thompson. Dec 62, 305p refs
Technical note D-608.

NASA N63-19963 OTS $3.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
LUNAR FLIGHT STUDY SERIES: VOLUME 3. EARTH TO MOON TRAJECTORY INVESTIGATION FOR MISSION PROFILES INVOLVING A LUNAR PARKING ORBIT, by Nolan J. Braud. 15 Nov 62, 34p
MTP-AERO-62-84; NASA TM X-50278

NASA N63-19943 OTS $2.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
SURVEY AND CLASSIFICATION OF EARTH-MOON TRAJECTORIES BASED ON NEWLY DISCOVERED PROPERTIES, by R. F. Hoelker and N. J. Braud.
20 May 63, 30p 2refs
MTP-AERO-63-39; NASA TM-X-50185.

Presented at the AIAA Summer Meeting, Los Angeles, June 17-20, 1963.

NASA N63-18648 OTS $8.60

McGill U., Montreal (Canada)
THE HYPERVELOCITY IMPACT OF PELLET WITH THIN PLATES: THEORETICAL CONSIDERATIONS, PART 2, by D. A. Millar, W. H. Friend, and C. L. Murphy. Oct 62, 96p 11refs
Contract NAS5-664
Report no. 62-8; NASA CR-50706

NASA N63-18863 OTS $1.60

National Aeronautics and Space Administration, Washington, D. C.
LUNAR EXPLORATION PROGRAM, by B. Mitwitzky.
5 Dec 61, 19p
NASA TM X-50135

AD-407 933 OTS $0.75

Naval Ordnance Lab., White Oak, Md.
THE SHOCK-TO-DETONATION TRANSITION IN SOLID EXPLOSIVES, by S. J. Jacobs, T. P. Liddiard, Jr., and B. E. Drimmer. 13 Nov 62, pub. Apr 63. 29p 32refs
NOLTR 62-197

DESCRIPTORS: *Explosive materials, *Propellants, *Shaped charges, *RDX, *TNT, Sensitivity, *Detonations, *Shock waves.

Experiments on the initiation of detonation in cast and pressed explosives (TNT and various cyclotols), subjected to plane shocks introduced at a plane surface, are presented and discussed. Shock amplitudes ranging from 28 to 140 kilobars in the explosive were generated by using plane wave lenses with various combinations of donor explosive and barrier composition and geometry. The shock velocity was obtained in each sample as a function of distance of travel into the wedge-shaped specimen from distance-time records obtained with a smear camera. The resulting curves for cast explosives are found to be quite different from those for pressed explosives. Furthermore, cast TNT exhibited a result anomalous to the other cast charges. The observations are interpreted as showing evidence that "hot-spots" must be present behind the shock to explain the rapidity with which the detonation is established. Sources of hot-spot formation are suggested. The results obtained at the lower shock amplitudes when compared to results on the NOL gap test lend support to the idea that peak pressure and pressure history in the shocked elements of explosive are far more important than wave shape in determining the time for transition to detonation. (Author)

NASA N63-19951 OTS $8.60

North American Aviation, Inc., Downey, Calif.
SELF-DEPLOYING SPACE STATION - VOLUME II, APPENDIXES, by L. M. Tinnan and E. A. Weber.
10 Apr 62, 100p 146refs
Contract NAS1-1630
SID-62-658-2; NASA CR-50735: includes N63-19952-19953

NASA N63-19852 OTS $5.60

United States Rubber, Wayne, N. J.
A RESEARCH STUDY TO INVESTIGATE THE APPLICATION OF FILAMENT WINDING FOR SECTIONS OF AN ERECTABLE SPACE STATION.
Final rept. by M. W. Olson. Apr 63, 53p 8refs
Contract NAS1-2317
NASA CR-50826

PB 163 695 OTS $9.60

Watervliet Arsenal, N. Y.
THE AUTOFRETTAGE PRINCIPLE AS APPLIED TO HIGH STRENGTH LIGHT WEIGHT GUN TUBES. Rept. on Industrial Preparedness Measure 8030-4231-03-46100-01, by T. E. Davidson, C. S. Barton, A. N. Reiner, and D. P. Kendall. Oct 59, 113p 28refs
Technical rept. WVT-RI-5907, Revision 1

DESCRIPTORS: *Gun barrels, Design, Tensile properties, Test methods, Cylindrical bodies, Elasticity, Stresses, Hysteresis, Machining

Developed and described are data and design criteria and the process to be utilized for the application of the autofrettage principle to high strength gun tubes. The developed data, which is based on a nominal yield strength of 165,000 pounds per square inch, is compared to various thick-wall cylinder theories. Empirical data and relationships are presented for the pressure-strain curve, the one hundred percent overstrain or optimum condition, permanent enlargement ratio, longitudinal strain and other phenomenon associated with the overstraining of thick-wall cylinders of intermediate diameter ratio. Strain "stabilization", the hysteresis loop effect, effects of machining, and reverse yielding are briefly analyzed and discussed. A typical experimentally determined residual stress distribution is presented and compared to that predicted from theory based on various yield criteria.

Sanitation and Safety Engineering

WT-1462 OTS $1.50

Health and Safety Lab., Atomic Energy Commission, New York.
PROTECTION AGAINST FALLOUT RADIATION IN A SIMPLE STRUCTURE. Rept. on Operation PLUMBBOB, by A. J. Breslin, P. Loysen, and M. S. Weinstein. Apr 62, 61p

NYO-9773 OTS $2.75

Johns Hopkins U., Baltimore, Md.
TRUCKING OF RADIOACTIVE MATERIALS: SAFETY VS. ECONOMY IN HIGHWAY TRANSPORT, by Ferdinand F. Leimkuhler. Jun 63, 164p 78refs
Contract AT(30-1)1477

UCRL-7254 OTS $1.25

Lawrence Radiation Lab., U. of California, Livermore.
HAZARDS CONTROL QUARTERLY REPORT NO. 11, OCTOBER-DECEMBER 1962. 52p 14refs
Contract W7405-eng-48

UCRL-7355 OTS $1.00

Lawrence Radiation Lab., U. of California, Livermore
HAZARDS CONTROL. Quarterly rept. no. 12, Jan-Mar 63. 1963, 9refs
Contract W7405-eng-48

PB 163 696 OTS $16.00

Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
WATER QUALITY MEASUREMENT AND INSTRUMENTATION. PROCEEDINGS OF A SYMPOSIUM HELD AT CINCINNATI, OHIO, AUGUST 29-31, 1960, by Richard S. Green. 1961, 242p 158refs
Technical rept. W61-2

DESCRIPTORS: *Water supplies, *Quality control, *Conferences, *Natural resources, Contamination, Marine biology, Wastes (Industrial), Radiological contamination, *Monitors, Automatic, *Data processing systems

Contents:
Water quality management of the future; Requirements for criteria of water quality; Evaluation of water quality protection techniques; Harvesting water quality data; Physical and chemical parameters; Aquatic organisms; Bacterial parameters of water quality; Detection and measurement of organic chemicals in water and waste; Radioactivity data - its significance; Basic considerations in sampling of tidal waters; A new look at water quality data; High quality water without high quality data - Is it possible?; Some observations on the advantages of sustained water quality data to private industry; The consulting engineer's need for water quality data; Water quality data and sustained fish harvests; Need and utilization of water quality data by Federal agencies; Introducing the ORSANCO Robot Monitor; Instrumentation for continuous analysis of constituents in water - A review; A new portable instrument for the continuous automatic collection of water samples; Monitoring stream quality; Automatic instrumentation for water analysis; Pollution control by continuous dissolved oxygen analysis and associated instruments; Recent advances in the continuous recording of the electrical conductivity of surface waters; Automatic surveillance - An operating system; Continuous monitoring of radioactive streams; Water - A glassful, a lakeful - The instrument approach; Analytical measurements for continuous transmission; Automatic continuous flow colorimetric and titrametric analyzers and turbidimeters; Introduction to the systems concept of an automated data acquisition, transmission, and processing system; Methods of data transmission; Application of digital data transmission to water monitoring data; A new medium for low cost recording; and, An information storage and retrieval system in the field of water quality.

TID-18262 OTS $4.60

Unidynamics, St. Louis, Mo.
INVESTIGATION OF THE EFFECTS OF IONIZING RADIATION ON THE SEDIMENTATION OF SEWAGE. Quarterly rept. 1 Jun-31 Oct 62. 43p 8refs
Contract AT(11-1)905

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB 163 677 OTS $13.50

General Dynamics/Convair, San Diego, Calif.
LARGE GROUND EFFECT AIRBORNE LOGISTICS VEHICLE STUDY. Final rept., by J. E. Loos. 15 Dec 59, 193p 31refs
Contract NOas-59-6167-c
Rept. no. ZP-294, Part I; AD-234 864

DESCRIPTORS: *Vehicles, Airborne, *Ground effect, Cargo vehicles, *Military transportation, Costs, *Jet propulsion, *Logistics, Design, Theory, Feasibility studies, *Ground effect machines.

A study was made of the feasibility of large airborne logistic vehicles operating within the ground effect. The vehicles considered are large vehicles with diameters of the order of 400 ft and operate at as low a height as possible. The vehicle planforms considered are circular and elongated with length to width ratios of two and three. A single annular jet at the planform circumference is used. The results of the study show the feasibility of large ground effect airborne logistic vehicles. Ground effect machines with a gross weight of 4,000,000 lbs., an operating height of 12 ft., and a speed of 100 knots have payloads of 1,000,000 lbs. to 2,000,000 lbs. even with the unlimited range provided with nuclear power. Preliminary direct operating costs indicate that the costs of transporting cargo by this type of vehicle are in the area of 3¢ to 5¢ per ton mile. (Author)

Engines and Propulsion Systems

ANL-6694 OTS $1.00

Argonne National Lab., Ill.
A 200-WATT CONDUCTION-COOLED REACTOR POWER SUPPLY FOR SPACE APPLICATION, by Donald R. MacFarlane. Mar 63, 44p 10refs
Contract W31-109-eng-38

TID-15223 OTS $4.60

Geoscience, Ltd., Solana Beach, Calif.
HIGH ACCELERATION FIELD HEAT TRANSFER FOR AUXILIARY SPACE NUCLEAR POWER SYSTEMS Quarterly technical rept. 1 Dec 61-28 Feb 62 by H. F. Poppendiek, N. D. Greene, H. G. Hughes, and C. M. Sabin. 49p 25refs
Contract AT(04-3)409

TID-16052 OTS $2.60

Geoscience, Ltd., Solana Beach, Calif.
HIGH ACCELERATION FIELD HEAT TRANSFER FOR AUXILIARY SPACE NUCLEAR POWER SYSTEMS. Quarterly technical rept. 1 Mar-31 May 62 by H. F. Poppendiek, N. D. Greene, H. R. Wright, and A. S. Thompson. 27p 2refs
Contract AT(04-3)409
GLR-9

TID-18028 OTS $11.50

Geoscience, Ltd., Solana Beach, Calif.
HIGH ACCELERATION FIELD HEAT TRANSFER FOR AUXILIARY SPACE NUCLEAR POWER SYSTEMS. Annual technical rept. 1 Sep 61-31 Aug 62, by H. F. Poppendiek, N. D. Greene, F. R. MacDonald, H. R. Wright, and C. M. Sabin. 157p 57refs
Contract AT(04-3)409
GLR-10

NASA N63-17549 OTS $0.75

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
MECHANICAL IMPENDANCE STUDY OF THE X-259 ROCKET MOTOR, by Raymond G. Hartenstein and William G. Elsen. Jun 63, 24p 1ref
Technical note D-1681

UCRL-7145 OTS $2.25

Lawrence Radiation Lab., U. of California, Livermore.
CONTROL OF THE BLOWDOWN AIR SUPPLY FOR THE TORY II-C NUCLEAR RAMJET ENGINE, by R. B. Hollstien. 1 Feb 63, 99p 5refs
Contract W7405-eng-48

NASA N63-19939 OTS $16.00

National Engineering Science Co., Pasadena.
INVESTIGATION OF BOUNDARY LAYER PARAMETERS IN APG NOZZLE AND THE FLOW INTERFERENCE CAUSED BY SECONDARY INJECTION. Final rept. by S. Hozaki, R. Gagnon, E. Mayer, J. Tromblay, and J. Wu. May 63, 249p 19refs
Contract NAS7-166
SN-101; NASA CR-50606

Machine Parts and Mechanisms

TID-18292 OTS $3.60

Franklin Inst., Philadelphia, Pa.
THE APPLICATION OF GAS-LUBRICATED BEARING TO HIGH-SPEED TURBO-MACHINERY. Quarterly technical rept. 1 Sep-30 Nov 62, by E. J. Gunter, J. G. Hinkle, and D. D. Fuller. 39p 3refs
Contract AT(30-1)2512.

NASA N62-12330 OTS $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
BEARINGS FOR VACUUM OPERATION RETAINER MATERIAL AND DESIGN, by Harold E. Evans and Thomas W. Flatley. May 62, 20p 4refs
Technical note D-1339

MATERIALS

NASA N63-19854 OTS $9.10

IIT Research Inst., Chicago, Ill.
STABLE WHITE COATINGS. Interim report no. 1, 22 Sep 61-1 Apr 62, by Edwin H. Tompkins. 13 Apr 62, 107p 9refs
Contract NASw-6
Report no. ARF-3207-5; NASA CR-50814

Adhesives and Sealants

NAA-SR-MEMO-8035 OTS $1.60

Atomics International, Canoga Park, Calif.
LEAKAGE CHARACTERISTICS OF MULTI-CONDUCTOR CABLES AND CONDUIT SEALS, by C. Nelson and S. Becker. 12 Dec 62, 15p
Contract AT(11-1)GEN-8

TID-18233 OTS $1.60

EANCO, Inc., Philadelphia, Pa.
REPORT ON GOODYEAR INFLATABLE SEAL TEST FOR E. G. C. R. CHARGE MACHINE BLISTER DRIVES. 7 Nov 62, 12p Prepared in cooperation with Associated Testing Labs., Inc., Wayne, N. J.

TID-18234 OTS $1.60

EANCO, Inc., Philadelphia, Pa.
REPORT ON GOODYEAR INFLATABLE SEAL TEST FOR E.G.C.R. CHARGE MACHINE BLISTER DRIVES. 9 Jan 63, 15p
Contract AT(40-1)2014
Prepared in cooperation with Associated Testing Labs., Inc., Wayne, N. J.

NASA N63-19595 OTS $4.60

General Electric Co., Schenectady, N. Y.
STUDY OF DYNAMIC AND STATIC SEALS FOR LIQUID ROCKET ENGINES, VOLUME I: DESCRIPTION OF PROGRAM AND RESULTS OF EVALUATION OF CURRENTLY AVAILABLE SEALING METHODS. Final rept., 26 Feb 62-25 Feb 63, by R. C. Elwell and A. J. Bialous. 29 Mar 63, 42p 8refs
Contract NAS7-102
NASA CR-50663

NASA N63-19498 OTS $12.00

General Electric Co., Schenectady, N. Y.
STUDY OF DYNAMIC AND STATIC SEALS FOR LIQUID ROCKET ENGINES, VOLUME 2: STUDIES ON SPECIAL TOPICS IN SEALING. Final rept., 26 Feb 62-25 Feb 63, by R. C. Elwell, L. H. Bernd, R. B. Fleming, R. E. Lee, Jr., and Dr. J. W. Marr. 29 Mar 63, 163p 34refs
Contract NAS7-102
NASA CR-50662

NASA N63-19597 OTS $12.50

General Electric Co., Schenectady, N. Y.
STUDY OF DYNAMIC AND STATIC SEALS FOR LIQUID ROCKET ENGINES, VOLUME 3B: BIBLIOGRAPHY OF OPEN LITERATURE ON SEALS. Final rept., 26 Feb 62-25 Feb 63, by R. L. George and R. C. Elwell. 29 Mar 63, 180p 1482refs
Contract NAS7-102
NASA CR-50660

NASA N63-18416 OTS $1.60

General Dynamics/Fort Worth, Tex.
HIGH TEMPERATURE PROTECTIVE COATINGS DEVELOPMENTS, by P. F. Ghena and J. E. Burroughs. [1963] 14p
NASA CR-50540.

Presented at the 7th Refractory Composites Working Group Meeting, Palo Alto, Calif., Mar 11-14, 1963.

LAMS-2917 OTS $0.75

Los Alamos Scientific Lab., N. Mex.
CERAMIC-TO-METAL SEALS FOR HIGH TEMPERATURE OPERATION, by E. L. Brundige and G. S. Hanks. 1 Apr 63, 36p 5refs
Contract W7405-eng-36

NYO-9801 OTS $4.60

Worthington Corp., Newark, N. J.
HIGH PRESSURE PUMP SEAL DEVELOPMENT, Engineering quarterly progress rept. Dec 62-Feb 63, by R. C. Hajner. 8 Mar 63, 49p
Contract AT(30-1)2682

Ceramics and Refractories

IS-578 OTS $1.25

Ames Lab., Iowa State U. of Science and Tech.
HIGH TEMPERATURE SPECTRAL EMISSIVITY OF YTTRIUM, SAMARIUM, GADOLINIUM, ERBIUM AND LUTETIUM OXIDES, by W. R. McMahon and D. R. Wilder. Jan 63, 48p 25refs
Contract W7405-eng-82.

BMI-1646 OTS $0.50

Battelle Memorial Inst., Columbus, Ohio.
FISSION-FRAGMENT-INDUCED EXPANSION IN SINGLE-CRYSTAL ALPHA ALUMINA, by Thomas S. Elleman, Robert B. Price, and Duane N. Sunderman. 4 Sep 63, 9p 5refs
Contract W7405-eng-92

DRI-2088 OTS $1.60

Denver Research Inst., Colo.
INTERMEDIATE-TEMPERATURE OXIDATION OF BERYLLIDES. Quarterly progress rept. 11 Mar 63, 17p
Contract AT(11-1)1092

GEMP-24A OTS $0.75

General Electric Co., Cincinnati, Ohio.
HIGH TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 24, part A. 28 Jun 63, 28p 12refs
Contract AT(40-1) 2847

GEMP-25A OTS $1.00

General Electric Co., Cincinnati, Ohio.
HIGH TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 25, Part A 31 Jul 63, 38p 8refs
Contract AT(40-1)2847

GEMP-26A OTS $0.75

General Electric Co., Cincinnati, Ohio.
HIGH-TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 26, Part A. 16 Aug 63, 28p
Contract AT(40-1)2847

HW-76301 OTS $2.50

Hanford Atomic Products Operation, Richland, Wash.
CERAMICS RESEARCH AND DEVELOPMENT OPERATION. Quarterly rept. Jan-Mar 63, 23 Aug 63, 129p
Contract AT(45-1)1350.

UCRL-10755 OTS $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
THE INFLUENCE OF TENSILE STRESS ON GASEOUS PERMEATION IN GLASSY-STATE AND COMPLEX CERAMICS. Master's thesis, by Orlin M. Stansfield. 2 Apr 63, 77p 24refs
Contract W7405-eng-48

TID-17594 OTS $5.60

Owens-Corning Fiberglas Corp. [Granville] Ohio.
INVESTIGATIONS OF RADIOACTIVE FUEL-BEARING GLASSES. Annual rept. no. 1, 1 Jan-30 Sep 58, by P. A. Lockwood. 55p 2refs
Contract AT(30-1)1995

MATHEMATICS

TID-18252 OTS $2.60

Mechanical Technology Inc., Latham, N. Y.
SOME COMPUTER RESULTS IN THE DIRECT ITERATION SOLUTION OF THE ELASTOHYDRODYNAMIC EQUATIONS, by R. J. Wernick. Feb 63, 27p 8refs
Contract Nonr-3729(00)
MTI-62TR38

NASA N63-19029 OTS $3.60

RIAS, Inc., Baltimore, Md.
ASYMPTOTIC FIXED POINT THEOREMS AND PERIODIC SYSTEMS OF FUNCTIONAL-DIFFERENTIAL EQUATIONS, by G. Stephen Jones. May 63, 39p 16refs
Contracts NASr-103; AF 49(638)382 and Nonr-3693(00)
Technical rept. no. 63-12; NASA CR-50715.

Computing Devices

ANL-6722 OTS $0.50

Argonne National Lab., Ill.
AN INFORMATION-THEORETICAL MODEL APPLIED TO COMPUTER PROGRAMS, by W. R. Cowell. Jun 63, 18p 8refs
Contract W31-109-eng-38.

ANL-6699 OTS $0.75

Argonne National Lab., Ill.
PROGRAM FOR THE LOCATION OF FOURIER PEAK CENTERS. Final rept. by M. H. Mueller, Fred Clark, and S. H. Simonsen (Texas U.) Jul 63, 33p 5refs
Contract W31-109-eng-38

ANL-6716 OTS $0.75

Argonne National Lab., Ill.
TRANSFER FUNCTION SYNTHESIS AS A RATIO OF TWO COMPLEX POLYNOMIALS, by C. K. Sanathanan and Judith Koerner. May 63, 36p 6refs
Contract W31-109-eng-38

TID-18116 OTS $1.60

Atomics International, Canoga Park, Calif.
FORTRAN SNG CODE, by Barbara Lemke. 28 Jul 59, 18p 1ref
Contract AT(11-1)GEN-8.

TID-18478 OTS $5.60

Digital Computer Lab., U. of Illinois, Urbana.
TECHNICAL PROGRESS REPORT. PART I. HIGH SPEED COMPUTER PROGRAM. PART II. CIRCUIT RESEARCH PROGRAM. PART III. SWITCHING THEORY. PART IV. MATHEMATICS. PART V. IBM 7090-1401 SYSTEM. PART VI. GENERAL LABORATORY INFORMATION. Feb 63, 51p
Contract AT(11-1)415

TID-18236 OTS $4.60

Digital Computer Lab., U. of Illinois, Urbana.
TECHNICAL PROGRESS REPORT. PART I. HIGH-SPEED COMPUTER PROGRAM. PART II. CIRCUIT RESEARCH PROGRAM. PART III. SWITCHING THEORY. PART IV. DATA REDUCTION METHODS. PART V. IBM-7090-1401 SYSTEM. PART VI. INSTRUCTIONAL USE OF THE IBM-7090-1401 SYSTEM. PART VII. GENERAL LABORATORY INFORMATION. Jan 63, 43p
Contract AT(45-1)415

NASA N63-18869 OTS $11.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
INTERPLANETARY TRAJECTORY ENCKE METHOD (ITEM) PROGRAM MANUAL, by Henry Wolf, Fred Shaffer, and R. K. Squires. 1 May 63, 160p
NASA X-640-63-71; NASA TM X-50131

HW-76692 OTS $1.50

Hanford Atomic Products Operation, Richland, Wash.
GENORO, A GENERAL DATA FITTING AND LINEAR FUNCTIONAL EVALUATION COMPUTER CODE FOR THE IBM 7090, by C. A. Oster. May 63, 62p
Contract AT(45-1)1350.

SCR-641 OTS $2.50

Sandia Corp., Albuquerque, N. Mex.
A MATHEMATICAL MODEL FOR AN ASSOCIATIVE MEMORY, by G. J. Simmons. Apr 63, 113p 15refs
Contract AT(29-1)789

DP-822 OTS $1.00

Savannah River Lab., Aiken, S. C.
PROCESSING OF ALPHANUMERIC DATA IN FORTRAN, by Barbara B. Occhipinti. Jun 63, 43p
Contract AT(07-2)1

NASA N63-12340 OTS $1.60

Theoretical Chemistry Inst., U. of Wisconsin, Madison.
AN EXPANSION OF $J_\nu(\nu x)$ IN POWERS OF $(1/\nu)$ by C. F. Curtiss. 17 Dec 62, 13p 4refs
Grant NsG-275-62
WIS-TCI-7, series 2

Y-1420 OTS $0.75

Union Carbide Nuclear Co., Oak Ridge, Tenn.
AN EXTENSION OF APT TO OBTAIN CENTROID AND INERTIA INFORMATION, by A. H. Fowler and C. W. Wilson. 21 May 63, 29p
Contract W7405-eng-26

damping and lack of static stability. The control level, sensitivity, and aircraft damping required at speeds near hover for satisfactory control are strongly influenced by the level of speed stability, control lags, level of steady and variable winds, and level of rapid outside disturbances. The variation of lateral stability around hover follows the same general trends as the speed stability. The dynamic stability of the VTOL/STOL aircraft generally improves at the end of transition. A discussion of some of the maneuvers required during hover and transition is presented.

PB 163 780 OTS $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INVESTIGATION OF PHUGOID EFFECTS ON GCA LANDINGS, by Fred Newell. Dec 57, 40p 2refs
Contract AF 33(616)3927
WADC TR 57-650; AD-142 084

DESCRIPTORS: *Aeronautics, Airplanes, *Flight paths, *Airplane landings, *Ground-controlled approach radar, Test equipment, Test methods, Tests, Oscillation, Damping.

In 10% of the photographs of the GCA precision radar presentations of 308 landing approaches made by fighters, cargo and bomber type aircraft, evidence of the phugoid was definite. There were no distinct differences noted among the types of aircraft. It appears that the phugoid wavelength may be the important phugoid parameter while an aircraft is on the final approach. It is indicated that the pilot normally suppresses the effect of the phugoid motion in GCA approaches. It is recommended that an investigation using a variable stability airplane be undertaken to evaluate the advantage of relieving the pilot of this task and to determine the effect of the phugoid on pilot technique.

NASA N63-13912 Repriced OTS $0.75

Flight Research Center, National Aeronautics and Space Administration, Edwards, California.
SKIN AND STRUCTURAL TEMPERATURE MEASURED ON THE X-15 AIRPLANE DURING A FLIGHT TO A MACH NUMBER OF 3.3, by Robert D. Reed and Joe D. Watts. Jan 61, declassified 8 Feb 63. 24p 1ref
Technical memo no. X-468.

NASA N63-13907 Repriced OTS $1.50

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FREE-FLIGHT INVESTIGATION AT SUPERSONIC SPEEDS OF THE STABILITY AND DRAG OF A 79° CLIPPED DELTA BOOST-GLIDE CONFIGURATION INCLUDING AN ANALOG STUDY OF COUPLED MOTIONS DURING THE FLIGHT, by Sherwood Hoffman and Willard S. Blanchard, Jr. Jan 61, declassified 8 Feb 63. 61p 19refs
Technical memo no. X-425.

K-1577 OTS $0.50

Oak Ridge Gaseous Diffusion Plant, Tenn.
ELECTRO-PNEUMATIC CONSTANT VOLUME MANOMETER, by J. Farquharson. 15 Aug 63, 12p 2refs
Contract W7405-eng-26

NASA N63-19949 OTS $6.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THEORY OF HYPERSONIC LAMINAR STAGNATION REGION HEAT TRANSFER IN DISSOCIATING GASES, by S. M. Scala and L. M. Gilbert. Apr 63, 70p 33refs
Contract NAS7-100
R63SD40; NASA CR-50882

METALLURGY

USBM-U-1057 OTS $0.75

Albany Metallurgy Research Center, Ore.
QUARTERLY METALLURGICAL PROGRESS REPORT NO. 19, 1 Apr-30 Jun 1963, 32p
Contract AT(11-1)599

IS-662 OTS $0.50

Ames Lab., Iowa State U. of Science and Tech.
INVESTIGATION OF VIBRATORY POLISHING VARIABLES, by E. N. Hopkins and D. T. Peterson. Jun 63, 17p 2refs
Contract W7405-eng-82

IS-576 OTS $0.50

Ames Lab., Iowa State U. of Science and Tech.
THE WORK HARDENNING OF AMES THORIUM, by D. E. Williams and W. L. Larsen. Jul 63, 18p 4refs
Contract W7405-eng-82

ANL-FGF-409 OTS $1.60

Argonne National Lab., Ill.
NEW FABRICATION PROCEDURES FOR HIGH-QUALITY TUBING, by N. H. Polakowski and J. E. Flinn, Jr. 2 Jan 63, 18p 3refs
Contract W31-109-eng-38

ANL-6711 OTS $0.75

Argonne National Lab., Ill.
PHASE RELATIONSHIPS IN THE SYSTEM URANIUM OXIDE-LANTHANUM OXIDE, by D. C. Hill, J. H. Handwerk, and R. J. Beals. Jun 63, 29p 11refs
Contract W31-109-eng-38.

NAA-SR-MEMO-8336 OTS $1.10

Atomics International, Canoga Park, Calif.
COEFFICIENT OF FRICTION BETWEEN ZIRCONIUM ALLOY II AND GRAPHITE, by M. Dudley. 21 Mar 63, 8p
Contract AT(11-1)GEN-8.

MECHANICS

NASA N63-19851 OTS $2.60

Exotech Inc., Alexandria, Va.
GRAVITY GRADIENT TORQUES ON A SUN-ORIENTED SPACE STATION, by S. Schalkowsky and W. C. Cooley. 20 Dec 62, 23p
Contract NASw-543
Report no. TR-001; NASA CR-50785

PB 163 776 OTS $4.60

[Davidson Lab.] Stevens Inst. of Tech., Hoboken, N. J.
TESTS OF SURFACE-PIERCING STRUTS. Letter rept. by Paul Kaplan. 24 Apr 53, declassified 4 Feb 55. 45p 4refs
Contract Nonr-906(00) [Subcontract to Bath Iron Works Corp.]
Rept. no. LR-488; AD-61 796

DESCRIPTORS: *Hydrofoils, *Planing surfaces, *Hydrodynamics, Models(Simulations), Drag, Yaw, Tests, Hydrofoil boats.

The present report covers a series of tests on six strut shapes. Tests were performed to determine drag and side force in yawed and unyawed attitudes at various rake angles and submergences.

NASA N63-19945 OTS $7.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A CONTRIBUTION TO THE THEORY OF CRITICAL INCLINATION OF CLOSE EARTH SATELLITES. 2. CASE OF ASYMMETRICAL POTENTIAL, by Shinko Aoki. [1963] 72p 5refs
NASA TM X-50238

HE-150-210 OTS $10.10

Institute of Engineering Research, U. of California, Berkeley.
TRANSIENT STRESS DISTRIBUTION IN A RAPIDLY HEATED ROD, by A. L. Austin. 14 Feb 63, 130p 41refs
Series no. 128, issue no. 11

KAPL-M-JVM-4 OTS $7.60

Knolls Atomic Power Lab., Schenectady, N. Y.
BEAM-1: BEAMS ON ELASTIC FOUNDATIONS, by Julius A. Mirabal and Judith K. Van Voorhis. Dec 62, 74p 4refs
Contract W31-109-eng-52.

NASA N63-14026 OTS $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
PERFORMANCE OF ELECTRICAL-RESISTANCE STRAIN GAGES AT CRYOGENIC TEMPERATURES, by Albert Kaufman. Mar 63, 22p 3refs
Technical note D-1663.

UVA-184-61S OTS $5.60

Research Labs. for the Engineering Sciences, U. of Virginia, Charlottesville.
FLEXURAL VIBRATION OF UNIFORM SHAFTS, by L. W. Nelson Nov 61, 59p
Contract AT(40-1)1779
Rept. no. EP-4422-184-61S

NASA N63-19856 OTS $2.60

Stanford U., Calif.
LOWER BOUNDS FOR THE BUCKLING PRESSURE OF SPHERICAL SHELLS(Rev.), by Nicholas J. Hoff and Tsai-Chen Soong. Apr 63, 27p 7refs
Grant NsG-93-60
SUDAER-133; NASA CR-50600

NASA N63-17202 OTS $2.60

Stanford U., Calif.
A METHOD OF DISCUSSION OF THE ELASTIC STABILITY IN NON-LINEAR SNAP BUCKLING. (SNAP BUCKLING OF CIRCULAR PLATES DUE TO RAPID HEATING OR COOLING). Technical rept. no. 5, by Masuji Uemura. Feb 63, 30p 9refs
Grant NsG-93-60
SUDAER-145; NASA CR-50243

Aerodynamics and Pneumatics

NASA N63-14029 OTS $1.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
AN EXPERIMENTAL EVALUATION OF AERODYNAMIC DAMPING MOMENTS OF CONES WITH DIFFERENT CENTERS OF ROTATION, by William R. Wehrend, Jr. Mar 63, 52p 4refs
Technical note D-1768.

PB 163 693 OTS $15.50

Bell [Aerosystems Co.] Buffalo, N. Y.
A STUDY OF VTOL/STOL FLYING QUALITIES REQUIREMENTS. Final rept., Jan-1 Jul 60, by J. Madden, J. Kroll, and D. Neil. 10 Aug 60, 233p 43refs
Contract NOas 60-6067-f
Rept. no. 2023-917001; AD-245 368

DESCRIPTORS: *Vertical take-off planes, *Airplanes, Design, Military requirements, Stability, Control, Ground effect, Maneuverability, Airplane landings, Take-off, Automatic pilots, *Aerodynamics, *Short take-off planes, Flight testing.

Horizontal attitude VTOL/STOL aircraft that are potentially able to meet the conventional flight flying qualities military specifications were considered in this study. The configurations investigated in this study ranged from speed stable to slightly unstable at velocities close to hover. For stick fixed conditions, unstable dynamic oscillations exist due to high values of speed stability caused by power effects, insufficient

NASA N63-19265 OTS $1.10

New England Materials Lab., Inc., Medford, Mass.
DEVELOPMENT OF Ni-Cr-Al ALLOYS FOR HIGH TEMPERATURE TUBING APPLICATIONS. Quarterly progress rept. no. 3, 1 Jan-31 Mar 63, by A. S. Bufferd. 15 Apr 63, 8p
Contract NAS8-5085
NASA CR-50758

NMI-4992 OTS $1.75

Nuclear Metals, Inc., Concord, Mass.
PAPERS PRESENTED AT THE X-RAY PREFERRED ORIENTATION MEETING HELD AT NUCLEAR METALS, INC., WEST CONCORD, MASSACHUSSETTS ON DECEMBER 7-8, 1961, comp. by R. B. Russell. 9 May 63, 74p 4refs
Contract AT(30-1)1565

TID-18324 OTS $1.10

Rensselaer Polytechnic Inst., Troy, N. Y.
THE COMPARISON OF SINTERING LOOSE METAL POWDERS AND PRESSED METAL POWDER COMPACTS. Progress rept. 1 Mar 62-28 Feb 63, by Fritz V. Lenel. Mar 63, 7p
Contract AT(30-1)2408

DP-802 OTS $0.50

Savannah River Lab., Aiken, S. C.
ELECTROWINNING CERIUM METAL, by J. A. Porter and L. P. Fernandez. May 63, 24p 2refs
Contract AT(07-2)1.

GEAP-4211 OTS $1.25

Vallecitos Atomic Lab., General Electric Co., Pleasanton, Calif.
SPECIFIC ZIRCONIUM ALLOY DESIGN PROGRAM. Quarterly progress rept. no. 4, Jan-Mar 63, by H. H. Klepfer, E. L. Dunn and others. 1 Apr 63, 55p 2refs
Contract AT(04-3)189.
EURAEC-604

TID-18341 OTS $1.10

Yale U., New Haven, Conn.
MAGNETORESISTANCE OF THE ALLOY Cu_3Au. Final rept., by Robert B. Gordon. Feb 63, 16p 3refs
Contract AT(30-1)2029

Ferrous Metals

MSAR-62-12 OTS $1.10

MSA Research Corp., Callery, Pa.
EFFECT OF 1200° F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PART I. PHYSICAL PROPERTIES OF MATERIALS. PART II. THERMAL SHOCK. Progress rept. no. 17 for Jan 62. 13 Feb 62, 3p
Contract AT(11-1)765

MSAR-62-33 OTS $1.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200° F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PART I. PHYSICAL PROPERTIES OF MATERIALS. PART II. THERMAL SHOCK. Progress rept. no. 19 for Mar 62, by R. C. Andrews. 18 Apr 62, 19p
Contract AT(11-1)765

MSAR-62-41 OTS $1.10

MSA Research Corp., Callery, Pa.
EFFECT OF 1200° F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PART I. PHYSICAL PROPERTIES OF MATERIALS. PART II. THERMAL SHOCK, Progress rept. no. 20 for Apr 62, by R. C. Andrews. 16 May 62, 10p
Contract AT(11-1)765

MSAR-62-50 OTS $1.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200° F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PART I. PHYSICAL PROPERTIES OF MATERIALS. PART II. THERMAL SHOCK. Progress rept. no. 21 for May 62. 11 Jun 62, 13p
Contract AT(11-1)765, PR-21

MSAR-62-77 OTS $1.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200° F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PART I. PHYSICAL PROPERTIES OF MATERIALS. PART II. THERMAL SHOCK. Progress rept. no. 22 for June 62. 16 Jul 62, 20p
Contract AT(11-1)765

MSAR-62-92 OTS $2.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200° F SODIUM ON AUSTENITIC AND FERRITIC STEELS. PHYSICAL PROPERTIES OF MATERIALS. Progress rept. no. 23 for July 62. 15 Aug 62, 24p
Contract AT(11-1)765

MSAR-63-33 OTS $3.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200°F SODIUM ON AUSTENITIC AND FERRITIC STEELS. Progress rept. no. 29, Jan 63. 15 Feb 63, 40p
Contract AT(11-1)765

MSAR-59-133 OTS $6.60

MSA Research Corp., Callery, Pa.
EFFECT OF 1200° F SODIUM ON AUSTENITIC AND FERRITIC STEELS. THERMAL SHOCK, NITRIDING, STRESSED CORROSION UNSTRESSED CORROSION. Bi-monthly progress rept. no. 2, Sep-Oct 59. 4 Dec 59, 61p 74refs
Contract AT(11-1)765

BMI-1636 OTS $1.00

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF NIOBIUM-BASE ALLOYS FOR USE IN A NUCLEAR SUPERHEATER, by John A. DeMastry, Warren E. Berry, Arthur A. Bauer, and Frank A. Rough. 27 Jun 63, 40p 13refs
Contract W7405-eng-92
EURAEC-744

BMI-1638 OTS $0.75

Battelle Memorial Inst., Columbus, Ohio.
RADIATION STABILITY OF URANIUM MONONITRIDE, by Richard A. Wullaert, John F. Lagedrost, Josef Bugl, and John E. Gates. 28 Jun 63, 34p 12refs
Contract W7405-eng-92
EURAEC-760

BMI-1633 OTS $1.75

Battelle Memorial Inst., Columbus, Ohio.
FABRICATION AND PROPERTIES OF HOT-PRESSED URANIUM MONONITRIDE, by Edward O. Speidel and Donald L. Keller. 30 May 63, 66p 28refs
Contract W7405-eng-92
EURAEC-706

TID-18197 OTS $1.10

California Inst. of Tech., Pasadena.
CsCl-TYPE COMPOUNDS IN BINARY ALLOYS OF RARE EARTH METALS WITH GOLD AND SILVER, Technical rept. no. 12, by C. C. Chao, H. L. Luo, and P. Duwez. 10p 12refs
Contracts AT(04-3)221 and Nonr-220(30)

AD-284 337 OTS $1.10

General Dynamics/Astronautics [San Diego, Calif.].
EVALUATION OF ELECTROFORMED NICKEL TO 301 STAINLESS STEEL RESISTANCE SPOTWELDS AT 78°F AND -423°F. Quarterly progress rept. no. 1, Phase 1, 1 Jun-1 Sep 62, on Compilation of Materials Research Data, by A. F. Hooper. 1 Sep 62, 8p 1ref
Contract AF 33(616)7984
Rept. no. MRG-288

DESCRIPTORS: *Nickel, *Electroforming, *Stainless steel, *Welding, *Electric welding, *Spot welds, Tensile properties, Shear stresses, Low temperature research, Guided missile components.

As evaluated by the notched tensile test .062" electroformed nickel had excellent toughness at -423°F having a notched-unnotched ratio of 1.21. The electroformed nickel resistance spotwelded to .020" type 301 (0-71004) stainless steel met the shear and tension requirements of MIL-W-6858A. The .020"-301 to .062" electroformed nickel spotweld tension strengths increased in value at -423°F as compared to spotweld tension strengths in .020" type 301 welded to Inconel-X and to itself which decreased at cryogenic temperatures. (Author)

TID-18150 OTS $5.60

General Electric Co., Cincinnati, Ohio.
NEUTRON IRRADIATION EFFECTS IN A-286, HASTELLOY X AND RENE' 41, by F. C. Robertshaw, J. Moteff, F. D. Kingsbury, and M. A. Pugacz. 24 Sep 62, 55p 8refs

GEAP-3726 OTS $1.25

General Electric Co., San Jose, Calif.
SODIUM MASS TRANSFER. II SCREENING TEST DATA AND ANALYSIS. VOLUME 2. METALLURGY, by F. J. Hetzler and R. S. Young. Jun 62, 59p 17refs
Contract AT(04-3)189

HW-78132 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
SURFACE TENSION STUDIES ON URANIUM AND COPPER, by J. H. Hoage. 22 Jul 63, 16p 20refs
Contract AT(45-1)1350

ARF-2158-15 OTS $1.60

IIT Research Inst., Chicago, Ill.
DEVELOPMENT AND EVALUATION OF HIGH-TEMPERATURE TUNGSTEN ALLOYS. Quarterly rept. no. no. 1, 1 Oct - 31 Dec 59, by F. C. Holtz and R. J. Van Thyne. 20 Jan 60, 15p
Contract AT(33-3)4

UCRL-10816 OTS $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
RECOVERY OF INTERNALLY OXIDIZED SILVER-MAGNESIUM ALLOYS. Master's thesis, by R. Busch. Jun 63, 65p 55refs
Contract W7405-eng-48

LA-2871 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
CRITICAL STRAIN IN HIGH PURITY TANTALUM AND TANTALUM-TUNGSTEN ALLOYS, by D. J. Murphy, W. E. Ferguson, and G. S. Hanks. 10 Sep 62, 24p 9refs
Contract W7405-eng-36

LAMS-2906 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
A NEW BRITTLENESS TEST FOR POWDER METALLURGY MATERIALS, by William H. Lenz. 12 Jul 63, 26p 1ref
Contract W7405-eng-36.

AD-416 662 OTS $1.25

Rock Island Arsenal Lab., Ill.
THE USE OF VOLATILE CORROSION INHIBITORS WITH FERROUS AND NONFERROUS METAL FINISHES. Technical rept. by Robert E. Johnson. 28 May 63, 47p 11refs
Rept. no. 63-1836; NASA N63-19497

DESCRIPTORS: *Corrosion inhibition, *Paper, *Nitrites, *Protective coverings, Coatings, *Metal plating, Oxides, Manganese compounds, Zinc compounds, Phosphates, Chromium plating, Cadmium plating, Zinc plating, *Storage.

Four volatile corrosion inhibitor (VCI) materials were evaluated up to eight years in outdoor, shed, and indoor storage to determine the degree of protection provided to packaged ferrous and nonferrous metal panels with various finishes, and to determine the necessity of providing a well sealed package to reduce the loss of VCI vapors. The work indicated that there are VCI materials available that will provide satisfactory protection to ferrous metal finishes in extended storage. One of the VCI materials was found to be superior to all other materials evaluated. It was shown that the VCI materials provided no significant protection to nonferrous finishes, such as cadmium and zinc plate. The addition of an overwrap of MIL-B-121, Grade C barrier material and a coating of VV-S-190 dipcoating wax to the VCI wrapped panels provided the greatest amount of protection to both ferrous and nonferrous finishes.

Y-1417 OTS $2.00

Union Carbide Nuclear Co., Oak Ridge, Tenn.
STRESS CORROSION CRACKING IN URANIUM-MOLYBDENUM ALLOYS, by J. W. Pridgeon. 6 May 63, 89p 16refs
Contract W7405-eng-26

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

TID-18184 OTS $1.10

Argonne National Lab., Ill.
THE DECOMPOSITION OF PLUTONIUM HEXAFLUORIDE BY RADIATION, by M. J. Steindler, R. P. Wagner, and J. Fischer Dec 62, 4p
Contract W31-109-eng-38

TID-3575 OTS $0.75

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
ACTIVATION ANALYSIS. A Literature search, comp. by Henry D. Raleigh. Aug 63, 31p 390refs

BNL-796(T-305) OTS $2.50

Brookhaven National Lab., Upton, N. Y.
HIGH-PRESSURE GAMMA LOOP FOR BROOKHAVEN NATIONAL. Jun 63, 141p
Contract AT(30-2)GEN-16
(Prepared in cooperation with Burns and Roe, Inc.)

BNL-748 OTS $0.75

Brookhaven National Lab., Upton, N. Y.
INTRODUCTORY LECTURES ON THE PROPERTIES, DETECTION, AND CHEMICAL EFFECTS OF HIGH ENERGY RADIATIONS, by Donald J. Metz. Sep 62, 30p 4refs
T-274

TID-18144 OTS $1.10

Case Inst. of Tech., Cleveland, Ohio.
AN APPARATUS FOR THE STUDY OF PRIMARY PROCESSES IN RADIATION CHEMISTRY, by J. Marquisee and E. W. Abrahamson. 1962, 8p 4refs
Contract AT(11-1)904

TID-18261 OTS $7.60

Clark U., Worcester, Mass.
RESEARCH IN NUCLEAR AND RADIOCHEMISTRY. Annual progress rept. for year ending 31 Jan 63, by T. T. Sugihara 77p 18refs
Contract AT(30-1)1930

HW-76363 OTS $1.60

Hanford Atomic Products Operation, Richland, Wash.
AN ANALYSIS FOR FREE NITRIC ACID AND TOTAL NITRATE ION IN URANYL NITRATE AND PLUTONIUM NITRATE SOLUTIONS USING A CATION EXCHANGE RESIN, by M. H. Campbell and J. F. Adams. 6 Feb 63, 12p 4refs
Contract AT(45-1)1350

HW-75278 OTS $1.00

Hanford Atomic Products Operation, Richland, Wash.
COMPARISON OF WESTCOTT SPECTRUM WITH THE GAS AND WATER KERNEL MODELS: DETERMINATION OF THE NEUTRON TEMPERATURE AND EPITHERMAL INDEX, by F. G. Dawson and L. H. Steves. Oct 62, 33p 12refs
Contract AT(45-1)1350.

HW-SA-2877 OTS $4.60

Hanford Atomic Products Operation, Richland, Wash.
HOT-CELL STUDIES ON THE SOLIDIFICATION OF HANFORD HIGH-LEVEL WASTES BY RADIANT-HEAT SPRAY AND POT CALCINATION, by R. T. Allemann, R. L. Moore, F. P. Roberts, and U. L. Upson. Jan 63, 42p 13refs
Contract AT(45-1)1350

HW-77311 OTS $1.25

Hanford Atomic Products Operation, Richland, Wash.
PHYSICS RESEARCH QUARTERLY REPORT, JANUARY-MARCH, 1963. 15 Apr 63, 47p 10refs
Contract AT(45-1)1350

Light Metals

HW-76642 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
RADIATION EFFECTS ON ALUMINUM FILMING AND CORROSION, by R. B. Richman. 20 Feb 63, 16p 34refs
Contract AT(45-1)1350

UCRL-10793 OTS $1.00

Lawrence Radiation Lab., U. of California, Berkeley.
DISLOCATION SUBSTRUCTURE IN QUENCHED ALUMINUM SINGLE CRYSTALS. Master's thesis, by J. L. Strudel. Jun 63, 43p 31refs
Contract W7405-eng-48

NMI-4950 OTS $8.10

Nuclear Metals, Inc., Concord, Mass.
RIBBED BERYLLIUM TUBING EXTRUSION PROGRAM. Final rept. phase 1, by V. Nerses and J. M. Siergiej. 17 May 61 82p
Contract AT(30-1)1565

Nonferrous (except light) Metals

HW-78178 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
YIELDING BEHAVIOR OF NEUTRON-IRRADIATED NICKEL, by J. J. Laidler. 10 Jul 63, 17p 24refs
Contract AT(45-1)1350

UCRL-10778 OTS $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
THE SUBSTRUCTURE OF PLASTICALLY DEFORMED NICKEL. Doctoral thesis, by Richard L. Nolder. Apr 63, 59p 26refs
Contract W7405-eng-48

Structural Metallurgy and Corrosion

EURAEC-550 OTS $1.60

Centre d'Etude de l'Energie Nucleaire, Mol (Belgium)
IN-PILE CORROSION OF NUCLEAR MATERIALS. Quarterly rept. no. 3, 1 Oct-31 Dec 62, 16p
Contract 084-62-3-RDB.

RFP-307 OTS $0.50

Dow Chemical Co. [Denver] Colo.
CORROSION STUDIES ON 304 STAINLESS STEEL CONTAINING ONE PERCENT BORON-10, by F. E. Butler. 19 Jul 63, 10p
Contract AT(29-1)1106

AD-411 116 repriced $2.00

General Electric Co., Cincinnati, Ohio.
RESEARCH ON CHROMIUM-BASE ALLOYS EXHIBITING HIGH-TEMPERATURE STRENGTH, LOW-TEMPERATURE DUCTILITY, AND OXIDATION RESISTANCE. Final rept., 15 Mar 62-15 Mar 63, on Metallic Materials, by Carl S. Wukusick. Jun 63, 80p 22refs
Contract AF 33(657)8471
ASD-TDR-63-493; NASA N63-18787

DESCRIPTORS: *Chromium alloys, Mechanical properties, Additives, Brittleness, Ductility, High temperature research, Low temperature research, Oxidation, Rhenium alloys, Hafnium alloys, Thorium alloys, Yttrium, Dispersion hardening, Yttrium compounds, Tensile properties, Hardness, Microstructure, Titanium alloys, Carbon alloys, Iron alloys, Tantalum alloys, Tungsten alloys, Vandium alloys, Aluminum alloys, Molybdenum alloys, Nitrogen, Oxides.

Improvements in ductility, strength, and oxidation resistance of chromium were obtained by combinations of small amounts of rhenium and reactive metal additions (yttrium, thorium, and hafnium). Dispersions, formed by reactions between impurities and reactive metal additions or by the addition of dispersoid-forming elements, resulted in increased ductility and strength. Combinations of reactive metal additions were more effective in improving ductility and oxidation resistance than single additions. Possible mechanisms are outlined. Two alloys exhibited resistance to nitrification for 100 hours at 2500 F in thick sections. These were a Cr - 10 wt-% Re + Y, Th, and Hf alloy and a Cr - 15 volume percent Y_2O_3 - 1 wt-% Y cermet. Thin sections exhibited less resistance to nitrification. (Author)

GEAP-4165 OTS $4.60

General Electric Co., San Jose, Calif.
GENERAL AND STRESS CORROSION OF HIGH NICKEL ALLOYS IN SIMULATED SUPERHEAT REACTOR ENVIRONMENT, by W. L. Pearl and G. G. Gaul. Jan 63, 47p 8refs
Contract AT(04-3)189.

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Hanford Atomic Products Operation, Richland, Wash.
CORROSION STUDIES IN SIMULATED N-REACTOR SECONDARY SYSTEM WATER ENVIRONMENT, by A. P. Larrick. May 63, 26p 11refs
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Hanford Atomic Products Operation, Richland, Wash.
FRETTING CORROSION OF 1/8-INCH Zr-2 CLAD THERMOCOUPLES, by Vincent F. FitzPatrick. 30 Nov 62, 7p
Contract AT(45-1)1350

TID-7641 OTS $4.50

Oak Ridge National Lab., Tenn.
CONFERENCE ON NUCLEAR REACTOR CHEMISTRY [NO. 3] GATLINBURG, TENNESSEE, OCTOBER 9-11, 1962. 396p

ORNL-3440 OTS $0.50

Oak Ridge National Lab., Tenn.
RECURSION RELATIONS AND SIMPLIFIED EXPRESSIONS FOR THE 6-j SYMBOLS, by C. D. Zerby. 1963, 9p 5refs
Contract W7405-eng-26

PUC-1963-96 OTS $18.00

Palmer Physical Lab., Princeton U., N. J.
THE NUCLEAR MOMENTS OF N^{13} AND C^{11} (thesis), by Robert A. Haberstroh. Feb 63, 283p 124refs
Contract AT(30-1)937

TID-18165 OTS $4.60

Purdue U., Lafayette, Ind.
A FISSION STUDY OF U^{235} AND U^{238}, by Sheldon Henry Freid. Jan 63, 42p 52refs

TID-18189 OTS $1.10

Purdue U., Lafayette, Ind.
NUCLEAR MAGNETIC RESONANCE TUBES AND VISIBLE AND ULTRAVIOLET CELLS FOR USE IN LIQUID HYDROGEN FLUORIDE, by M. D. Campbell and A. F. Clifford. 1961, 5p 2refs
Contract AT(11-1)620

DP-261 OTS $8 10

Savannah River Lab., Aiken, S. C.
ISOTOPIC PURIFICATION OF TRITIUM BY ELECTROLYSIS, by B. S. Johnson, Jr., J. T. Grace, D. G. Karraker, L. H. Meyer and C. K. Nicholson. May 58, 81p 4refs
Contract AT(07-2)1.

TID-18299 OTS $3.60

Savannah River Lab., Aiken, S. C.
ORGANOPHOSPHORUS COMPOUNDS, OTHER THAN TBP, FOR PROCESSING OF IRRADIATED FUELS AND BY-PRODUCTS, by T. H. Siddall, III. Mar 63, 39p 17refs
Contract AT(07-2)1

NAA-SR-6309 OTS $13.00

TAPCO, Div. of Thompson Ramo Wooldridge Inc. [Cleveland, Ohio]
THE SNAP II POWER CONVERSION SYSTEM. TROPICAL REPORT NO. 17. MERCURY BOILING RESEARCH, by R. G. Gido and Alfred Koestel. Oct 62, 184p 29refs
Contract AT)11-1)GEN-8, subcontract with Atomics International
TRW rept. no. ER-4833

TID-18290 OTS $1.60

Union Carbide Nuclear Co., Paducah, Ky.
SEPARATION OF TECHNETIUM-99 FROM URANIUM HEXAFLUORIDE, by W. R. Golliher, R. A. LeDoux, S. Bernstein, and V. A. Smith. [1962] 15p 7refs
Contract W7405-eng-26

GEAP-3743(Pt. I) OTS $1.25

Vallecitos Atomic Lab., General Electric Co., San Jose, Calif.
RADIATION EFFECTS IN BORIDES. PART I HELIUM RELEASE AND SWELLING IN IRRADIATED BORIDES, by E. W. Hoyt and D. L. Zimmerman. 13 Feb 62, 45p 15refs
Contract AT(04-3)189

TID-17670 OTS $1.60

Westinghouse Electric Corp., Pittsburgh, Pa.
INTENSITY MODULATION OF GAMMA RAYS BY MEANS OF MAGNETIC FIELDS, by R. Zito and L. M. Epstein. 23 Oct 62, 13p 2refs
Contract AT(30-1)2989
Scientific Paper 62927-11506-P1

TID-18127 OTS $1.60

Yale U., New Haven, Conn.
SUMMARY OF PROGRESS REPORT /ON NUCLEAR PHYSICS/ DURING YEARLY PERIOD ENDING FEBRUARY 1963, 17p 20refs
Contract AT(30-1)1807

Elementary Particles

ANL-6727 OTS $0.50

Argonne National Lab., Ill.
FAST NEUTRON SCATTERING FROM Ta^{181}, by A. B. Smith. May 63, 17p 31refs
Contract W31-109-eng-38

BNL-6765 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
NEUTRON SOURCES. CROSS SECTIONS AND ANGULAR DISTRIBUTIONS, by Murrey D. Goldberg 1963, 33p 25refs
Contract AT(30-2)GEN-16

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California U., Los Angeles.
MEASUREMENT OF THE SLOW NEUTRON ABSORPTION CROSS SECTION OF SOME HEAVY ISOTOPES, by Spofford Grady English. 21p
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SHIELDING REQUIREMENTS FOR PROMETHIUM SOURCES, by H. H. Van Tuyl, F. P. Roberts, and E. J. Wheelwright. Apr 63, 34p 32refs
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ARF-1193-20 OTS $6.60

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SCINTILLATION SPECTROMETER MEASUREMENTS OF CAPTURE GAMMA RAYS FROM NATURAL ELEMENTS. Quarterly rept., 1 Nov 62 – 31 Jan 63, by R. C. Greenwood, J. H. Reed, and R. D. Kolar
27 Feb 63, 63p 30refs
Contract AT(11-1)578

ARF-1207-9 OTS $1.10

Illinois Inst. of Tech., Chicago, Ill.
RESEARCH ON NEW METHODS OF PREPARING HIGH SPECIFIC ACTIVITY RADIOISOTOPES. Quarterly progress rept. no. 3, 1 Sep-31 Nov 62, by P. Y. Feng. 9 Jan 63, 8p
Contract AT(11-1)578

NASA N63-18858 OTS $1.10

Laboratories for Applied Sciences, U. of Chicago, Ill.
THE UNIVERSITY OF CHICAGO MEASUREMENT IN SPACE OF COSMIC RAYS AT ENERGIES ABOVE 0.5 MEV, by J. E. Lamport and L. J. Petraitis. [1961] 4p 6refs
Contract NASw-24
NASA CR-50582

Presented at the joint Nuclear Instrumentation Symposium, Raleigh, N. C., Sep 6, 1961.

UCRL-10850 OTS $3.00

Lawrence Radiation Lab., U. of California, Berkeley.
THE EFFECT OF ANGULAR MOMENTUM OF THE COMPOUND NUCLEUS OF THE RATIO OF THE ISOMERS Te^{119} AND Te^{119m} PRODUCED IN LOW-ENERGY BOMBARDMENTS. Doctoral thesis, by David W. Seegmiller. Aug 63, 206p 96refs
Contract W7405-eng-48

UCRL-10747 OTS $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
ELECTRONIC AND NUCLEAR PROPERTIES OF Er^{171}, Tm^{171}, AND Tb^{161}. Doctoral thesis, by Isaac Maleh. 29 Mar 63, 77p 39refs
Contract W7405-eng-48

UCRL-10862 OTS $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
PHYSICS DIVISION SEMIANNUAL REPORT, NOVEMBER 1962-APRIL 1963. 20 May 63, 83p 52refs
Contract W7405-eng-48

LA-2912 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
A NEUTRON DIFFRACTION EXAMINATION OF ALPHA PLUTONIUM AT 23 °K, by R. B. Roof, Jr. 19 Jul 63, 26p 6refs
Contract W7405-eng-36

MMPP-226-1 OTS $7.60

Michigan U., Ann Arbor.
NEUTRON ABSORPTION IN PILE NEUTRON ACTIVATION ANALYSIS, by Ove T. Hoegdahl. Dec 62, 72p 42refs
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TID-18428 OTS $1.10

Michigan U., Ann Arbor.
ON THE ENERGY-DEPENDENT TRANSPORT EQUATION, by G. C. Summerfield and P. F. Zweifel. 1962, 5p 5refs
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Michigan U., Ann Arbor.
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Contract AT(11-1)1143
ORA-04997-1-P

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Mound Lab., Miamisburg, Ohio.
RADIOACTIVE IMPURITIES IN THE POLONIUM PROCESS AT MOUND LABORATORY, by R. C. Lange. 3 Jun 63, 11p 5refs
Contract AT(33-1)GEN-53

NAS-NS-3108 OTS $0.50

National Bureau of Standards, Washington, D. C.
APPLICATION OF DISTILLATION TECHNIQUES TO RADIOCHEMICAL SEPARATIONS, by James R. DeVoe. Aug 62, 37p 66refs

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National Lead Co. of Ohio, Cincinnati.
SUMMARY TECHNICAL REPORT, APRIL 1-JUNE 30, 1963, 18 Jul 63, 48p 9refs
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Instruments and Installations

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Argonne National Lab., Ill.
THE EFFECTS OF EDDY CURRENTS AND RESIDUAL FIELDS ON THE BETATRON OSCILLATIONS AT INJECTION, by T. K. Khoe. 14 Jan 63, 8p
Contract W31-109-eng-38

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MAGNET DESIGN SUGGESTIONS, by R. A. Beth. 12 Mar 63, 12p
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PROPERTIES OF QUADRUPOLE MAGNET DOUBLETS, by W. F. Baker. May 63, 45p 4refs
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T-304

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SOME DESIGN CONSIDERATIONS ON A HIGH ENERGY CYCLOTRON TO ACCELERATE NEGATIVE HYDROGEN IONS, by J. Reginald Richardson
Sep 62, 26p 9refs
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DESIGN OF MODIFIED QUADRUPOLE MAGNETS, by Michael Goitein. Nov 62, 21p
Contract AT(30-1)2076

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SEMIANNUAL REPORT FOR THE PERIOD JULY 1-DECEMBER 31, 1962. 8 Feb 63, 14p
Contract AT(30-1)2076

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FORT McCLELLAN RADIOLOGICAL INSTRUCTION AREA (ARMS-II), by R. B. Guillou. 26 Mar 62, 17p
Contract AT(29-1)1183

HW-77517 OTS $0.50

Hanford Atomic Products Operation, Richland, Wash.
HIGH LEVEL DOSEMETER WITH METER INDICATION AND AURAL SIGNALING, by C. A. Ratcliffe and E. M. Sheen. 1 May 63, 9p
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LIQUID EFFLUENT MONITOR FOR RADIONUCLIDES, by E. M. Sheen. 1 Aug 63, 21p 1ref
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ANISOTROPY FACTORS FOR THE DETERMINATION OF TOTAL NEUTRON YIELD FROM THE $D(d, n)He_3$ AND $T(d, n)He_4$ REACTIONS, by Lawrence Ruby and Richard B. Crawford. 9 Apr 63, 16p 6refs
Contract W7405-eng-48

UCRL-7267 OTS $0.75

Lawrence Radiation Lab., U. of California, Livermore.
APPLICATION OF THE DEBYE MODEL TO SCATTERING OF NEUTRONS FROM CRYSTALS, by R. N. Stuart. 5 Mar 63 32p 11refs
Contract W7405-eng-48

UCRL-8030(Rev.) OTS $0.75

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Contract W7405-eng-48

UCRL-10762 OTS $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
THE EFFECTS OF FINAL-STATE INTERACTIONS ON SCATTERING PROCESSES. Thesis, by John R. Gillespie. 9 Apr 63, 76p 66refs
Contract W7405-eng-48

UCRL-10813 OTS $2.25

Lawrence Radiation Lab., U. of California, Berkeley.
ELASTIC K^+ - PROTON SCATTERING AT 910 MeV/c. POLARIZATION OF THE RECOIL PROTONS. Doctoral thesis, by Warner Hirsch. May 63, 98p 24refs
Contract W7405-eng-48

UCRL-10878 OTS $1.75

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A GENERALIZED OPTICAL-POTENTIAL METHOD AND ITS APPLICATION TO THE SCATTERING OF ELECTRONS BY ATOMIC HYDROGEN. Thesis, by Robert Ta-Pang Pu. 18 Jun 63, 76p 33refs
Contract W7405-eng-48

UCRL-10834 OTS $2.00

Lawrence Radiation Lab., U. of California, Berkeley.
HIGH ENERGY KAON-NUCLEON SCATTERING. Thesis, by Ismail A. Sakmar. May 63, 86p 27refs
Contract W7405-eng-48

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Lawrence Radiation Lab., U. of California, Berkeley.
π^+ -p SCATTERING AT 600 MeV Thesis, by Peter Cyrenius Adelbert Newcomb. 7 Jan 63, 80p 21refs
Contract W7405-eng-48

UCRL-10637 OTS $1.75

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POLARIZATION AND DIFFERENTIAL CROSS SECTIONS IN PROTON-PROTON AND PROTON-NUCLEUS SCATTERINGS AT 730 MeV. Thesis, by Paul G. McManigal. 15 Mar 63, 69p 34refs
Contract W7405-eng-48

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INITIAL CALIBRATION OF LANDSTUHL HUMAN RADIOACTIVITY DETECTOR (BODY COUNTER). Progress rept. no. 1, 1 Oct 58-30 Jun 59, on Study of Radioactivity in Man, by Charles O. Onstead, Frank V. Keary, Jack E. Redding, and John R. Appert. [1959] 10p 3refs
AD-218 530

DESCRIPTORS: *Radiation measurement systems, *Scintillation counters, *Gamma counters, Calibration, Radioactive isotopes, Cesium, Potassium, *Radiobiology, *Health physics instrumentation, Body.

The 2π scintillation counter was calibrated to study the radioactivity in man. Since the 2 significant γ emitting isotopes in the normal human are K-40 and Cs-137, calibration consisted of establishing efficiency curves for these 2 isotopes. Similar methods can be used to calibrate the instrument for other γ emitters which might be present under conditions of accidental contamination or in connection with diagnostic administration of isotopes. (DDC abstract)

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Technical note TN-63-4; NASA N63-19031

DESCRIPTORS: *Survival kits, Feasibility studies, Bailout, Analysis, *Shelters, *Sleeping bags, *Arctic regions.

This field trip was made to determine the hazards and problems of surviving in the Arctic under extreme cold. The clothing worn appeared to be inadequate to tolerated -35 to -40 F weather without suitable shelter. The MC-1 sleeping bag proved very inadequate and it should be replaced by more appropriate insulative items or modified. The shelter is extremely important at these temperatures. Snow affords the best available insulation; A-frame parachute shelters, teepees, etc. are not adequate. Survival is unlikely for more than two or three days unless a snow house or snow packed over the canopy shelter is used. After the first day, lethargy is common so it is most important that the survivor build the right shelter from the beginning. At this time of year there are several simple shelters that utilize snow for insulation. If no snow is available in timbered country, a structure built of grass and logs appears to offer excellent insulative properties. In extreme cold, it appears that the first thing to do is to build an adequate shelter for the first night. All of the subjects thought they would put up a crude shelter the first night and improve it the following day. However, the first night is extremely critical, and once over the first or second nights, things should become easier. (Author)

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Contract W7405-3ng-48

AD-257 478 OTS $3.60

Polytechnic Inst. of Brooklyn, N. Y.
RADIATION IN A PLASMA FROM A UNIFORMLY MOVING DISTRIBUTION OF ELECTRICAL CHARGE. Rept. on Energy Transfer to Surface Through Ionized Shock Waves, by Manlio Abele. Apr 61, 39p 6refs
Contract AF 30(602)2045
PIBAL rept. no. 645; RADC-TN-61-94

DESCRIPTORS: *Plasma oscillations, Electrons, Gases, Magnetic fields, *Electromagnetic waves, Shock waves, Cerenov radiation.

Electromagnetic radiation cannot be emitted by a uniformly moving electric charge in a plasma in the absence of external magnetic fields, because the phase velocity of an electromagnetic oscillation in a plasma is larger than the velocity of light in a vacuum. Plasma oscillations may be emitted when the velocity of the moving charge is larger than the velocity of sound in the electron gas. In this paper the electron oscillations are analyzed and the spectral distribution of the radiated energy is evaluated, assuming a uniform linear distribution of moving charge. (Author)

NASA N63-19855 OTS $8.60

Radiation Lab., U. of Michigan, Ann Arbor.
A STUDY OF VHF ABSORBERS AND ANECHOIC ROOMS, by R. E. Hiatt, E. F. Knott, and T. B. A. Senior. Feb 63, 97p 22refs
Contract NASr-54(L-1)
Report no. 5391-1-F; NASA CR-50753

TID-18335 OTS $1.10

Stevens Inst. of Tech., Hoboken, N. J.
MEASUREMENTS OF B, E, AND n INSIDE THE SIMULATED GEOMAGNETIC-CAVITY-IN-THE-PRESENCE-OF-SOLAR-WIND, by W. H. Bostick, H. Byfield, and M. Brettschneider. 62, 6p 7refs
Contract AT(30-1)2258

Acoustics

PB 163 698 OTS $2.60

Battelle Memorial Inst., Columbus, Ohio.
THE DEVELOPMENT OF A HIGH-LEVEL, DIRECTIONAL, UNDERWATER-SOUND SOURCE USING EXPLOSION-INDUCED SHOCK WAVES. Progress rept. no. 4, by E. G. Thurston, W. H. Peake, D. Ensminger, H. E. Trumbull, and J. H. Duffin. 1 Feb 54, declassified 1 Sep 58. 25p 1ref
Contract Nonr-903(00)
AD-33 800

DESCRIPTORS: *Underwater sound generators, Design, Underwater explosions, *Shock waves, *Detonators, Test equipment.

The floating measurement facility has been completed and is located on a lake formed by an abandoned quarry about 26 miles from Columbus. The unit using Primacord as the source of explosive shock waves was tested. A peak sound-pressure level of approximately 150 decibels referred to 1 dyne per square centimeter, at a distance of 1 meter on the axis of the projector, has been obtained; this fulfills the specified design requirement of "equal to or greater than 145 db". A system using pressure-activated switches and a hydrophone has been devised for the measurement of both the propagation velocity of the detonation wave tube and the pressure of the shock wave transmitted into the water at the immersed end.

PB 163 697 OTS $1.60

Battelle Memorial Inst., Columbus, Ohio.
THE DEVELOPMENT OF A HIGH-LEVEL, DIRECTIONAL, UNDERWATER-SOUND SOURCE USING EXPLOSION-INDUCED SHOCK WAVES. Progress rept. no. 5, 4 Jan-31 Mar 54, by D. Ensminger, F. E. Berger, and H. E. Trumbull. 31 Mar 54, declassified 1 Sep 58 12p
Contract Nonr-903(00)
AD-33 821

DESCRIPTORS: *Underwater sound generators, Design, Maintenance, Underwater explosions, *Shock waves, *Detonators, Test equipment.

Several firing mechanisms for the Primacord sound generator have been tested. Each one has presented problems in electrical insulation and shock resistance. However, methods for shielding all delicate parts from extreme shocks are being studied and tested.
(See also PB 163 698)

Electricity and Magnetism

ANL-6731 OTS $0.75

Argonne National Lab., Ill.
GALVANOMAGNETIC PROPERTIES OF URANIUM MONOSULFIDE, by Casimir W. Kazmierowicz. Jun 63, 28p 25refs
Contract W31-109-eng-38.

ARF-1184-8 OTS $3.60

IIT Research Inst., Chicago, Ill.
MAGNETIC PROPERTIES OF INSULATORS, Quarterly rept. no. 8, 16 Nov 62 - 15 Feb 63, by Jordan J. Markham. 1 Mar 63, 32p 11refs
Contract AT(11-1)578

Electronics

NASA N63-19205 OTS $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
OPTIMAL RANGING CODES, by R. C. Titsworth. 15 Apr 63, 23p 9refs
Contract NAS7-100
Technical rept. no. 32-411; NASA CR-50762

AD-406 616 repriced $0.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
AN EXPERIMENTAL WINTER FLYING GLOVE, by Paul W. Barnett and Kermit R. Skrettingland. Jan 63, 9p 8refs
Technical note TN-63-1; NASA N63-17093

DESCRIPTORS: *Gloves, Acceptability, Thermal insulation, *Arctic regions, *Flight clothing, Touch.

Loss of tactile discrimination and dexterity during critical phases of flight are common to arctic operations. The development of more efficient handwear would greatly enhance flying safety. A mouton glove was designed which maximized insulation and minimized impairment. Following field trials, this glove was compared with the MA-1 glove and the N-4B arctic mitten. Although the experimental glove compared favorably, it possessed no advantages worthy of additional consideration. While significant differences in temperature maintenance of the hand can be attributed to variations in the configuration of equivalent amounts of insulation, these differences (two degrees) are only of academic importance, and diminish with decreasing ambient temperatures. (Author)

AD-406 951 OTS $0.50

Arctic Aeromedical Lab., Fort Wainwright, Alaska.
SIMULATED SURVIVAL TREK FROM THE CONFLUENCE OF THE ANAKTUVUK AND COLVILLE RIVERS TO THE ARCTIC COAST, by James H. Veghte, Freeman E. White, and Robert C. Studley. Jan 63, 8p
Technical note TN-62-15

DESCRIPTORS: *Survival kits, Feasibility studies, *Arctic regions, Rivers.

This field trip was a continuation of a field trip from Anaktuvuk Pass to the Colville River. The purpose of this field exercise was to provide field experience in this area and to determine the merits and deficiencies of the F-102 Aircraft Survival Kit.

PHYSICS

ANL-6730 OTS $0.75

Argonne National Lab., Ill.
THE MORSE INDEX THEOREM AND GEOMETRICAL OPTICS, by Robert Hermann (Northwestern U.) May 63, 32p 8refs
Contract W31-109-eng-38

TID-18258 OTS $1.10

Georgia Inst. of Tech. School of Electrical Engineering, Atlanta.
THE IONIZATION OF ALKALI IONS BY ELECTRON IMPACT. Quarterly technical progress rept. no. 1, 1 Dec 62-28 Feb 63, by J. W. Hooper, E. W. McDaniel, and W. C. Lineberger 1 Mar 63, 6p
Contract AT(40-1)3027

UCRL-10650 OTS $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
EFFICIENCY OF EQUATIONS OF STATE FOR GASEOUS MIXTURES AT THE CRITICAL LOCUS. I. APPLICATION OF THE EQUATION OF BENEDICT, WEBB, AND RUBIN. II. FURTHER IMPROVEMENTS OF AN EQUATION OF STATE. Master's thesis, by Frank Jay Ackerman. 1 Feb 63, 70p 59refs
Contract W7405-eng-48.

UCRL-7376 OTS $0.75

Lawrence Radiation Lab., U. of California, Livermore.
TRANSPORT COEFFICIENTS FOR THE SQUARE WELL POTENTIAL MODEL, by S. G. Brush and J. D. Lawrence. 1 Jun 63, 27p
Contract W7405-eng-48

LA-2827 OTS $4.00

Los Alamos Scientific Lab., N. Mex.
MONTE CARLO CALCULATIONS OF THE EQUATION OF STATE OF SYSTEMS OF 12 AND 48 HARD CIRCLES, by W. W. Wood. 1 Jul 63, 310p 48refs
Contract W7405-eng-36

RRL-101 OTS $3.60

Mellon Inst. of Industrial Research, Pittsburgh, Pa.
OPTICAL STUDIES OF ANISOTROPIC COLOR CENTERS IN GERMANIUM-DOPED QUARTZ, by A. Halperin and J. E. Ralph. 24 Jan 63, 37p
Contract AT(30-1)2310

TID-18115 OTS $1.60

Miami U., Coral Gables, Fla.
BROWNIAN MOTION AND "RESONANCE DIFFUSION" IN A MAGNETIC FIELD, by Behram Kursunoglu, 1962, 20p 6refs
Contracts AT(40-1)2761 and AF19(604)8082

OTS SB-488, Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
MASERS AND LASERS. Jul 62, 15p 203refs
OTS Selective Bibliography SB-488, suppl. 1

DESCRIPTORS: *Masers, *Lasers, Irasers, Semiconductor devices, *Bibliographies.

Lists 203 reports and translations added to the OTS collection during the period July 1962 to August 1963. Covers research on optical and infrared masers, solid-state masers, solid-state maser applications, atomic hydrogen masers, maser-type spectroscopy, effects of intense laser-beams, maser preamplifiers, laser rangefinders, liquid laser research, laser signals, laser devices, gas discharge lasers, lasers and irasers as antimissile weapons, ewaser research, research on materials for masers and lasers. (Author)

BNL-6842 OTS $3.60

Brookhaven National Lab., Upton, N. Y.
DYNAMICS OF LOW-ENERGY RADIATION DAMAGE PROCESSES IN A BODY-CENTERED CUBIC LATTICE SIMULATING α -IRON, by Cavid Erginsoy. 1962, 36p 8refs
Contract AT(30-2)GEN-16

MND-2584-4 OTS $0.75

Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE SEMICONDUCTOR AND THERMOELEMENT RESEARCH AND DEVELOPMENT. Final technical rept. 13 Feb 61-17 Jul 62, by N. G. Asbed. 1962, 70p 5refs
Contract AT(30-1)2698.

AD-284 176 OTS $10.10

Stanford Electronics Labs., Stanford U., Calif.
HOT-ELECTRON EMISSION FROM SHALLOW P-N JUNCTIONS IN SILICON, by D. J. Bartelink. Apr 62, 130p 17refs
Contract DA 36-039-sc-85339
Technical rept. no. 1654-2; SEL-62-021

DESCRIPTORS: *Semiconductors, *Silicon, *Electrons, Emissivity, *Phonons, Scattering, Ionization, Transport properties, Theory, Quantum mechanics.

Emission of electrons from reverse-biased p-n junctions in silicon has been observed previously. Emission-current densities of 10^{-7} amp/cm^2 from junctions parallel to a clean silicon surface are reported here. The junctions were operated either in the breakdown range (5 - 6 v) or just below breakdown, in which case electrons were generated by photo-excitation. The observed emission characteristics can be explained quantitatively in terms of the junction parameters and the scattering of electrons by optical phonons and impact ionizations. The theory, derived for the description of the emission electrons on the basis of the Boltzmann transport equation has been kept sufficiently general to be valid over the range of uncertainty. The emission experiments were designed to enable the determination of the mean free paths and thus explain the observed emission.

TID-18297 OTS $5.60

Thomas J. Watson Research Center, Yorktown Heights, N. Y.
DEFECTS IN METALLIC AND IONIC CRYSTALS. Annual rept. 15 May 62-15 May 63 by A. S. Nowick. 56p 14refs
Contract AT(30-1)2811.

NYO-10472 OTS $1.50

[Technical Research Group] Syosset, N. Y.
SYNTHESIS OF SEMICONDUCTOR MATERIALS USING NUCLEAR RADIATION. Final rept. 1 May 59-31 Oct 62, by Kalman Held and Richard J. Goldman. Jan 63, 64p 8refs
Contract AT(30-1)2392
TRG-132

ANL-6729 OTS $1.75

Argonne National Lab., Ill.
A SIMPLE GRAPHICAL METHOD IN THE ANALYSIS OF SU_3, by S. Gasiorowicz. Jun 63, 68p 17refs
Contract W31-109-eng-38

TID-18340 OTS $2.60

Brandeis U., Waltham, Mass.
CONTINUOUS REPRESENTATIONS IN THE STATISTICAL THEORY OF ELECTRONIC ENERGIES, by Sidney Golden and George S. Handler. 1961, 25p 27refs Prepared in cooperation with Tufts U., Medford, Mass.
Contract AT(30-1)1355

NYO-10250 OTS $16.00

Rochester U., N. Y.
PRINCIPLES OF CLASSICAL DYNAMICS, by N. Mukunda. 23 Jan 63, 247p 26refs
Contract AT(30-1)875

Thermodynamics

ANL-6741 OTS $0.75

Argonne National Lab., Ill.
A PRACTICAL APPROACH TO AVAILABILITY AND IRREVERSIBILITY, by Barton M. Hoglund. Jun 63, 31p 3refs
Contract W31-109-eng-38.

BNL-6826 OTS $4.60

Brookhaven National Lab., Upton, N. Y.
HEAT TRANSFER TO MERCURY FLOWING IN-LINE THROUGH A BUNDLE OF CIRCULAR RODS, by M. W. Maresca and O. E. Dwyer. 31 Jan 63, 43p 10refs
Contract AT(30-2)GEN-16

TID-18334 OTS $1.60

Columbia, U., New York.
HIGH TEMPERATURE THERMAL PROPERTIES OF HELIUM AND OTHER FLUIDS. Progress rept. 1 Jun 62-31 May 63, by Charles F. Bonilla. 1 Mar 63, 19p
Contract AT(30-1)2660

NASA N63-18417 OTS $1.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
GAS IN MULTILAYER THERMAL INSULATION, by Billy P. Jones. 28 Jun 62, 19p 10refs
MTP-RP-62-5; NASA TM X-50156

UCRL-10849 OTS $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
AN EXPERIMENTAL INVESTIGATION OF THE STATE OF A HIGHLY IONIZED DECAYING HYDROGEN PLASMA. Doctoral thesis, by William Samuel Cooper, III. 17 Jun 63, 118p 77refs
Contract W7405-eng-48

UCRL-10698 OTS $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
INSTABILITY OF AN ALTERNATING-CURRENT POSITIVE COLUMN IN A MAGNETIC FIELD. Thesis, by Henry F. Rugge. 22 Apr 63, 123p 49refs
Contract W7405-eng-48

UCRL-7294 OTS $0.50

Lawrence Radiation Lab., U. of California, Livermore.
A HEATING MECHANISM FOR A PLASMA, by Daryl D. Reagan. 11 Apr 63, 9p 6refs
Contract W7405-eng-48.

LAMS-2911 OTS $0.50

Los Alamos Scientific Lab., N. Mex.
COMPARISON OF COMPUTED AND MEASURED BEHAVIOR OF FAST THETA PINCHES, by F. L. Ribe, R. M. Gilmer, H. C. Hoyt, G. Hain, and K. Hain. 9 Jul 63, 23p 14refs
Contract W7405-eng-36

LAMS-2916 OTS $1.25

Los Alamos Scientific Lab., N. Mex.
THE LASL CONTROLLED THERMONUCLEAR RESEARCH PROGRAM. Quarterly status rept. for period ending 20 May 63. Jun 63, 55p
Contract W7405-eng-36

TID-16057 OTS $1.60

Microwave Lab., Stanford U., Calif.
STUDIES OF PLASMA OSCILLATIONS. Quarterly status rept. no. 8, 1 Sep-30 Nov 61. May 62, 11p. 1ref
Contract AT(04-3)326

NASA N63-18398 OTS $1.10

Midwest Research Inst., Kansas City, Mo.
INFLUENCE OF SURFACE COATINGS ON EXOELECTRON EMISSION DURING FATIGUE. Quarterly progress rept. no. 7, 1 Mar-1 Jun 63, by J. C. Grosskreutz and David Benson. [1963] 9p
Contract NASr-63(02)
NASA CR-50477

TID-14035 OTS $4.60

Westinghouse Electric Corp., Elmira, N. Y.
UNITIZED SYSTEM OF IMAGE INTENSIFIERS USING FIBER OPTICS. Progress rept. 1 Oct 60-22 Jun 61, by J. S. Kalafut. 22 Jun 61, 45p
Contract AT(30-1)2176

Molecular Physics and Spectroscopy

TID-18265 OTS $1.10

Hughes Research Labs., Malibu, Calif.
STUDIES OF H_2^+ DISSOCIATION. PHASE III. Quarterly progress rept. no. 1, 15 Nov 62- 15 Feb 63 by A. W. Ehler. 28 Feb 63, 4p
Contract AT(04-3)362.

UCRL-10620 OTS $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
THE ABSOLUTE INTENSITY OF C_2 SWAN BANDS. Doctoral thesis, by Lucy Gay Hagan. 18 Mar 63, 117p 102refs
Contract W7405-eng-48

UCRL-10438 OTS $1.50

Lawrence Radiation Lab., U. of California, Berkeley.
MECHANICS OF MOLECULAR PHOTODISSOCIATION, by Richard N. Zare and Dudley R. Herschbach. Feb 63, 70p 25refs
Contract W7405-eng-48

Solid State Physics

ANL-6744 OTS $1.75

Argonne National Lab., Ill.
MANY-PARTICLE THEORY OF INTERACTING PHONONS IN A CRYSTAL, by J. J. Kokkedee. Jun 63, 74p 33refs
Contract W31-109-eng-38

ANL-6676 OTS $2.00

Argonne National Lab., Ill.
TABULATIONS OF CALCULATED CRYSTALLOGRAPHIC DATA FOR ALPHA PLUTONIUM, by Alan F. Berndt and Lowell T. Lloyd. Jun 63, 93p 8refs
Contract W31-109-eng-38.

NAA-SR-8235 OTS $0.50

Atomics International, Canoga Park, Calif.
ROLE OF Si, Al, AND OTHER IMPURITIES IN BeO CRYSTAL GROWTH, by S. B. Austerman 15 Jul 63, 18p 11refs
Contract AT(11-1)GEN-8

WAPD-270 OTS $0.50

Bettis Atomic Power Lab., Pittsburgh, Pa.
THE ELECTRICAL CONDUCTIVITY AND THERMOELECTRIC POWER OF URANIUM DIOXIDE, by R. A. Wolfe. Apr 63, 19p 25refs
Contract AT(11-1)GEN-14

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TID-15719 OTS $3.60

Michigan U., Ann Arbor.
LOW HEAT-FLUX BOILING. Quarterly progress rept. no. 2, 1 Oct 61-1 Jan 62, by John A. Clark, Herman Merte, Jr. Apr 62, 38p 80refs
Contract AT(38-1)260.

NASA N63-18997 OTS $1.10

Naval Research Lab., Washington, D. C.
HIGH TEMPERATURE PROPERTIES OF SODIUM AND POTASSIUM. Progress rept. no. 8, 1 Jul-30 Sep 62, by T. A. Kovacina, C. T. Ewing, J. P. Stone, and R. R. Miller. 31 Jan 63, 7p 3refs
Contract NAS C-76320
NRL rept. no. 5904; NASA CR-50737

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

TID-18485 OTS $1.60

Edgerton, Germeshausen and Grier, Inc., Boston, Mass.
A PROGRAMMED KERR CELL FRAMING CAMERA, by Sumner Ackerman. Apr 63, 19p
Contract AT(29-1)1183

NASA N63-18857 OTS $1.10

Midwest Research Inst., Kansas City, Mo.
UTILIZATION OF NASA-GENERATED SPACE TECHNOLOGY BY MIDWESTERN INDUSTRY. Quarterly progress rept. no. 1, 5 Nov 61-5 Feb 62, by H. M. Gadberry. [1962] 10p
Contract NASr-63(03)
NASA CR-50649

SOCIAL SCIENCES

NASA N63-18864 OTS $4.60

Harvard U. Graduate School of Business Administration, Cambridge, Mass.
SPACE, SOCIETY AND SOCIAL SCIENCE. REPORT TO THE COMMITTEE ON SPACE EFFORTS AND SOCIETY OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES, by John R. Seeley, Bertram M. Gross, Sumner Myers, Lewis A. Dexter, and Edward E. Furash. [Feb 63] 42p 11refs
Grant NsG-253-62
NASA CR-50437

PB 163 704 OTS $1.60

National Research Council. Div. of Anthropology and Psychology, Washington, D. C.
HUMAN ENVIRONMENTS IN MIDDLE AFRICA. PART II: IMPLICATIONS FOR AMERICAN NATIONALS. Final rept. Feb 61, 20p
Contract DA 19-129-qm-1309
AD-253 059

DESCRIPTORS: *Africa, *Biological environment, Ecology, Sociology, Transportation, Social communication, Labor, Population, Political science, Food, Economics.

Three recommendations were made regarding practical application and the training of practitioners to help solve the problems inherent in the impact between large incoming groups and large native populations. Practitioners should be incorporated into appropriate army elements or into the organizations of units carrying out economic development: and these units should have direct access to social scientists who are aware of the problems. These practitioners should be given fairly broad-gauge training and permitted to put such training into practice. Academicians should be invited to participate in at least the organization of any training program since, with some negligible exceptions, all behavioral scientists at the present are academicians. Economists, anthropologists, psychologists, cultural geographers, and sociologists should also be consulted at the beginning of any such program. While an academic consultant is not a substitute for a full-time practitioner, he is a link between the academic community and the applied scientists. (Author) (See also PB 163 703)

PB 163 703 OTS $10.50

National Research Council. Div. of Anthropology and Psychology, Washington, D. C.
HUMAN ENVIRONMENTS IN MIDDLE AFRICA. Final rept. Feb 61, 135p 81refs
Contract DA 19-129-qm-1309, FR, pt. 1
AD-253 069

DESCRIPTORS: *Africa, *Biological environment, Ecology, Population, Economics, Geography, Diet, Food, Labor, Transportation, Sociology, Political science, Commerce, Social communication, Scientific research.

Contents:
The physical environment and population
The social and political order
The economic order
Land
Foodstuffs and diet

SCR-645 OTS $0.50

Sandia Corp., Albuquerque, N. Mex.
THRESHOLD PARITY, A FOUNDATION FOR MUTUAL DETERRENCE, ARMS RACE CONTROL, AND DISARMAMENT, by J. D. Douglas, Jr. May 63, 19p.

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- Establishing a new business

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MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

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- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

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